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FM 6-120

DEPARTMENT OF THE ARMY FIELD MANUAL

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FIELD ARTILLERY TARGET ACQUISITION

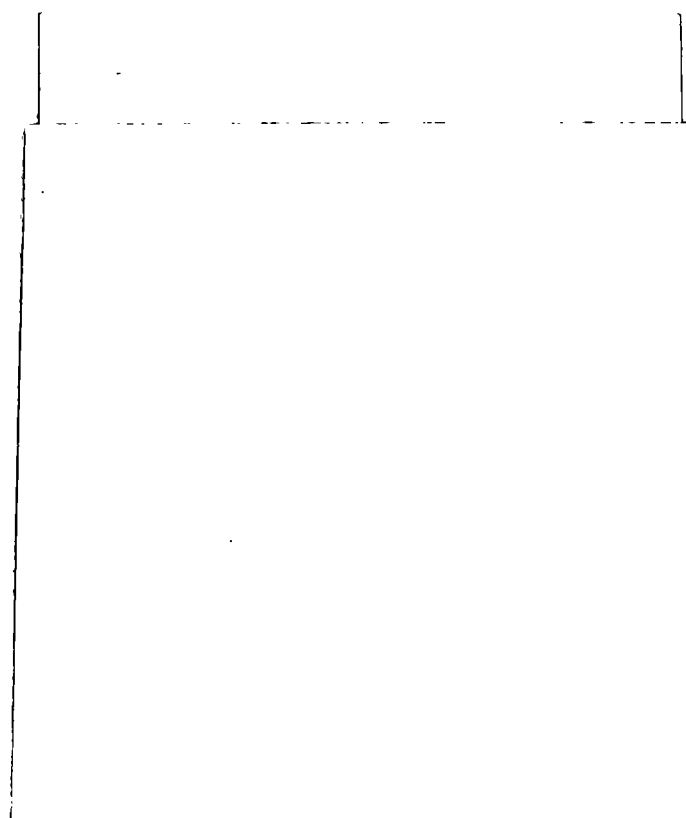
BATTALION AND BATTERIES

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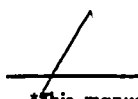


FIELD MANUAL }
No. 6-120

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 9 October 1967

FIELD ARTILLERY TARGET ACQUISITION BATTALION AND BATTERIES

	Paragraphs	Page
CHAPTER 1. INTRODUCTION		
Section I. General	1-1, 1-2	2
II. Missions	1-3—1-11	2, 3
III. Organization and duties of personnel	1-12—1-16	3—11
CHAPTER 2. TACTICAL EMPLOYMENT		
Section I. Principles of employment	2-1, 2-2	12
II. Employment	2-3, 2-4	13
III. Deployment	2-5—2-6	14
CHAPTER 3. RECONNAISSANCE, SELECTION, OCCUPATION, AND ORGANIZATION OF POSITION		
Section I. General	3-1, 3-2	15
II. Reconnaissance	3-3, 3-4	15, 16
III. Selection, occupation, and organization of position	3-5—3-9	16—19
CHAPTER 4. COMMUNICATION	4-1, 4-2	20
5. TARGET ACQUISITION MEANS AND ASSOCIATED OPERATIONS		
Section I. Sound ranging	5-1, 5-2	21, 22
II. Flash ranging	5-3—5-6	22, 23
III. Counterbattery radar	5-7—5-9	23, 24
IV. Survey	5-10—5-14	24—27
V. Meteorology	5-15—5-29	28—31
VI. Liaison	5-30, 5-31	31, 32
VII. Processing section	5-32—5-36	32—34
CHAPTER 6. SPECIAL OPERATIONS	6-1—6-6	35—38
APPENDIX A. REFERENCES	-----	39
INDEX	-----	40

 *This manual supersedes FM 6-120, 8 March 1962.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Purpose and Scope

a. This manual is a guide for the target acquisition battalion commander, battery commanders, staff officers, and other key personnel within the battalion and commanders of supported units, in the tactics and techniques of employment of the field artillery target acquisition battalion and batteries. The manual sets forth doctrine pertaining to the organization, duties of personnel, and tactical employment of the field artillery target acquisition battalion and batteries. For tactics and techniques common to all field artillery battalions and batteries, not contained in this manual, see FM 6-20-1, FM 6-20-2, and FM 6-140.

b. The material presented herein is applicable to general war to include considerations for employment of and protection from chemical, biological, and radiological agents; limited war; and cold war to include stability operations in an internal defense and internal development assistance operations environment.

c. Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be

keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to the Commanding Officer, U. S. Army Combat Developments Command Artillery Agency, ATTN: CAGAT-DC, Fort Sill, Oklahoma 73503. Originators of proposed changes which would constitute a significant modification of approved Army doctrine may send an information copy, through command channels, to Commanding General, U. S. Army Combat Developments Command, Fort Belvoir, Virginia 22060, to facilitate review and follow-up.

1-2. Application

This manual applies to units organized under the following Tables of Organization and Equipment:

a. TOE 6-575, Field Artillery Target Acquisition Battalion.

b. TOE 6-576, Headquarters and Headquarters Battery, Field Artillery Target Acquisition Battalion.

c. TOE 6-577, Field Artillery Target Acquisition Battery.

Section II. MISSIONS

1-3. General

Eight principal missions are performed by the field artillery target acquisition battalion. These are discussed in paragraphs 1-4 through 1-11.

1-4. Provide General Target Acquisition

The target acquisition battalion is the

principal agency for locating counterbattery targets in the corps zone of action. Location of counterbattery targets is performed by the sound ranging, flash ranging, and counterbattery radar platoons. Intelligence information is also collected and reported by the observation posts of the battalion located across the corps front.

1-5. Registration and Adjustment of Artillery Weapons

Registration and adjustment of artillery can be conducted by flash, sound, and radar ranging techniques. Utilizing these techniques, artillery can be registered and adjusted during periods of reduced visibility, darkness, or other times when visual observation is not possible. Sound and radar should not be diverted from their target location mission if other means of adjustment are available.

1-6. Provide Ballistic Meteorological (MET) Data

The target acquisition battalion provides ballistic meteorological messages and sound locating meteorological messages to the artillery with the corps. The messages are disseminated to units for the correction of firing data and sound locations.

1-7. Provide Wind Data for Determination of Fallout Predictions

The target acquisition battalion provides the wind data necessary for the determination of fallout predictions in the corps area. It also provides weather data to the air weather service.

1-8. Conduct and Coordinate Corps Artillery Survey Operations

The corps artillery survey officer (FATAB Commander) is responsible for coordinating with the engineer topographic company to insure receipt of survey control. The target acquisition battalion survey officer coordinates the survey operations of the artillery located in the corps area. The survey parties of the

battalion extend survey control either from existing control or from survey control points established by the corps engineer topo company, to division artillery, corps field artillery battalions, elements of the target acquisition battalion, and other units or installations as required. A survey information center (SIC) is located near the corps artillery fire direction center to disseminate survey information within the corps and to units in adjacent corps areas.

1-9. Perform Comparative Calibration of Artillery Weapons

The flash ranging platoons perform comparative calibration of friendly artillery. This can be accomplished on the battlefield.

1-10. Verify the Location of Nuclear Bursts Fired by Friendly Forces

The location of nuclear rounds delivered by friendly forces is verified by the flash ranging platoons of the battalion.

1-11. Provide Its Component of Corps Communication, Observation, and Fire Support Coordination System

The field artillery target acquisition battalion (FATAB) has a versatile, direct chain of communications that stems from the friendly frontlines to corps artillery. This system greatly enhances communications within the corps artillery and provides a link for rapid flow of target and other data to corps artillery. With observation posts and numerous other agencies, FATAB provides its portion of the coordinated ground observation within the corps zone of action.

Section III. ORGANIZATION AND DUTIES OF PERSONNEL

1-12. General

All operations and methods described in this manual are applicable to the current table of organization and equipment for the target acquisition battalion.

1-13. Target Acquisition Battalion

a. The target acquisition battalion consists of a headquarters and headquarters battery and three target acquisition batteries (fig.

1-1). The battalion is completely mobile with organic transportation.

b. Normally, one target acquisition battalion is assigned to each corps artillery.

1-14. Battalion Headquarters

The target acquisition battalion headquarters consists of the battalion commander and his staff. Its organization is similar to that of any other type artillery battalion head-

quarters. For detailed duties of individuals, see FM 6-140.

a. Battalion Commander. In addition to the normal duties found in FM 6-140, the target acquisition battalion commander is the corps artillery survey officer and serves as a special staff officer to the corps artillery commander.

b. Battalion Executive. For duties of the executive officer, see FM 6-140.

c. Personnel Officer (S1). For duties of the S1, see FM 6-140.

d. Intelligence Officer (S2). In the target acquisition battalion, the S2 and the S3 function as a team. In addition to the duties shown in FM 6-140, the S2 will—

- (1) Insure dissemination of periodic weather reports to the using agencies.
- (2) Receive, record, and forward shelling reports (SHELREPS) from target acquisition battalion agencies, and disseminate information and resulting intelligence to subordinate units and the next higher artillery headquarters.

e. Operations and Training Officer (S3). The S3's primary function is the locating of targets. As the principal staff officer for coordination of the target acquisition effort, the FATAB S3 directs the employment of the target locating agencies within the battalion. The duties of the FATAB S3 correspond to those described in FM 6-140 for the cannon battalion S3, with the following additions—

- (1) Coordinate the target locating agencies within the battalion; keep the S2 informed of map and photographic needs.

- (2) Receive, record, and forward to corps artillery all targets obtained from sound, flash, and radar ranging sources. Maintain the S3 situation map and other pertinent S3 records as required by the battalion commander and higher headquarters.

f. Supply Officer (S4). The duties of the battalion S4 conform to those described in FM 6-140 with the exceptions of other duties pertaining to service battery and artillery munitions.

g. Communication Officer. The battalion communication officer is charged with the planning, installation, and supervision of all signal communications for the battalion. For additional duties of the communication officer, see FM 6-10.

h. Battalion Survey Officer. The battalion survey officer advises the commander and staff in survey planning, and coordinates all artillery survey operations within the corps area.

i. Battalion Motor Officer. The battalion motor officer supervises the motor transport training, operation, and maintenance activities. For additional duties of the battalion motor officer, see FM 6-140.

j. Battalion Surgeon. The battalion surgeon has technical supervision over the medical

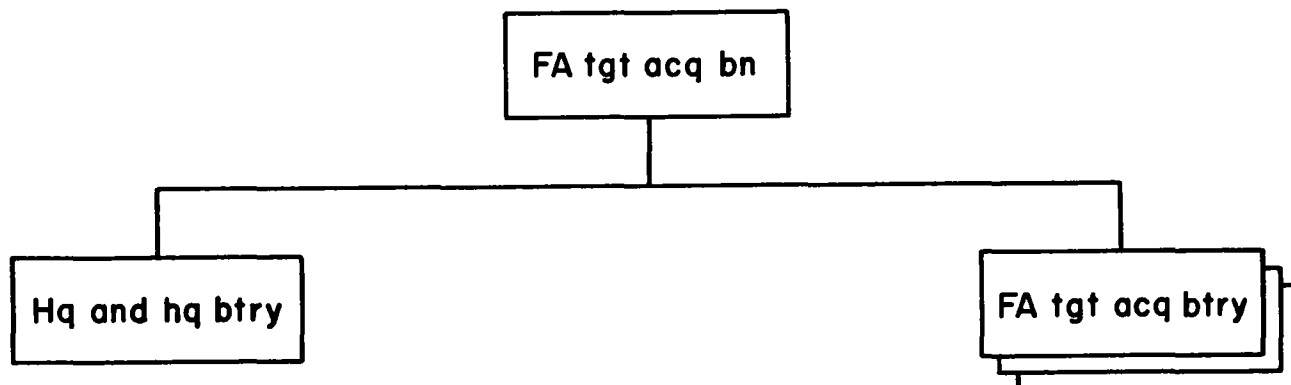


Figure 1-1. Field artillery target acquisition battalion (TOE 6-575).

section. He advises the commander and staff of the battalion on all matters pertaining to sanitation and health of the command. For additional duties of the battalion surgeon, see FM 6-140.

k. Sergeant Major. For duties of the sergeant major, see FM 6-140.

1-15. Headquarters Battery

Headquarters battery consists of a battery headquarters, operations platoon, survey platoon, communications platoon, personnel section, supply and maintenance section, and medical section (fig. 1-2).

a. Battery Headquarters. This headquarters commands and administers the battery and provides the support functions of mess, motor maintenance, and supply for the headquarters and headquarters battery.

b. Operations Platoon. The operations platoon contains personnel and equipment to—

- (1) Control, coordinate, and supervise the operations and training of the battalion.
- (2) Control, coordinate, and supervise the target acquisition and intelligence effort.
- (3) Provide meteorological data for the corps to include wind data for fallout predictions.
- (4) Operate a corps survey information center.

c. Survey Platoon. This platoon consists of a platoon headquarters and two survey sections equipped with electronic distance measuring equipment. The personnel and equipment of this platoon provide common survey control

to the field artillery units, division artilleries, and target acquisition batteries. They perform other survey operations as may be directed within the corps sector.

d. Communications Platoon. This platoon contains the personnel and equipment to—

- (1) Coordinate and supervise the planning and operation of the battalion communication system (wire and radio) and to establish a message center.
- (2) Establish and maintain the wire communication within headquarters and headquarters battery and to subordinate units.
- (3) Provide radio organizational maintenance for radios in headquarters battery.

e. Personnel Section. Maintains the personnel records and performs personnel administration for the battalion.

f. Battalion Supply and Maintenance Section. This section contains the personnel and equipment to—

- (1) Draw and issue all classes of supply and to supervise supply activities and supply records for the battalion.
- (2) Perform organizational motor maintenance as designated in maintenance allocation charts for the battalion and give limited maintenance assistance and supervision to the batteries in areas other than motor maintenance.

g. Medical Section. This section provides medical care and evacuation, and furnishes aidmen to the battalion and attached units.

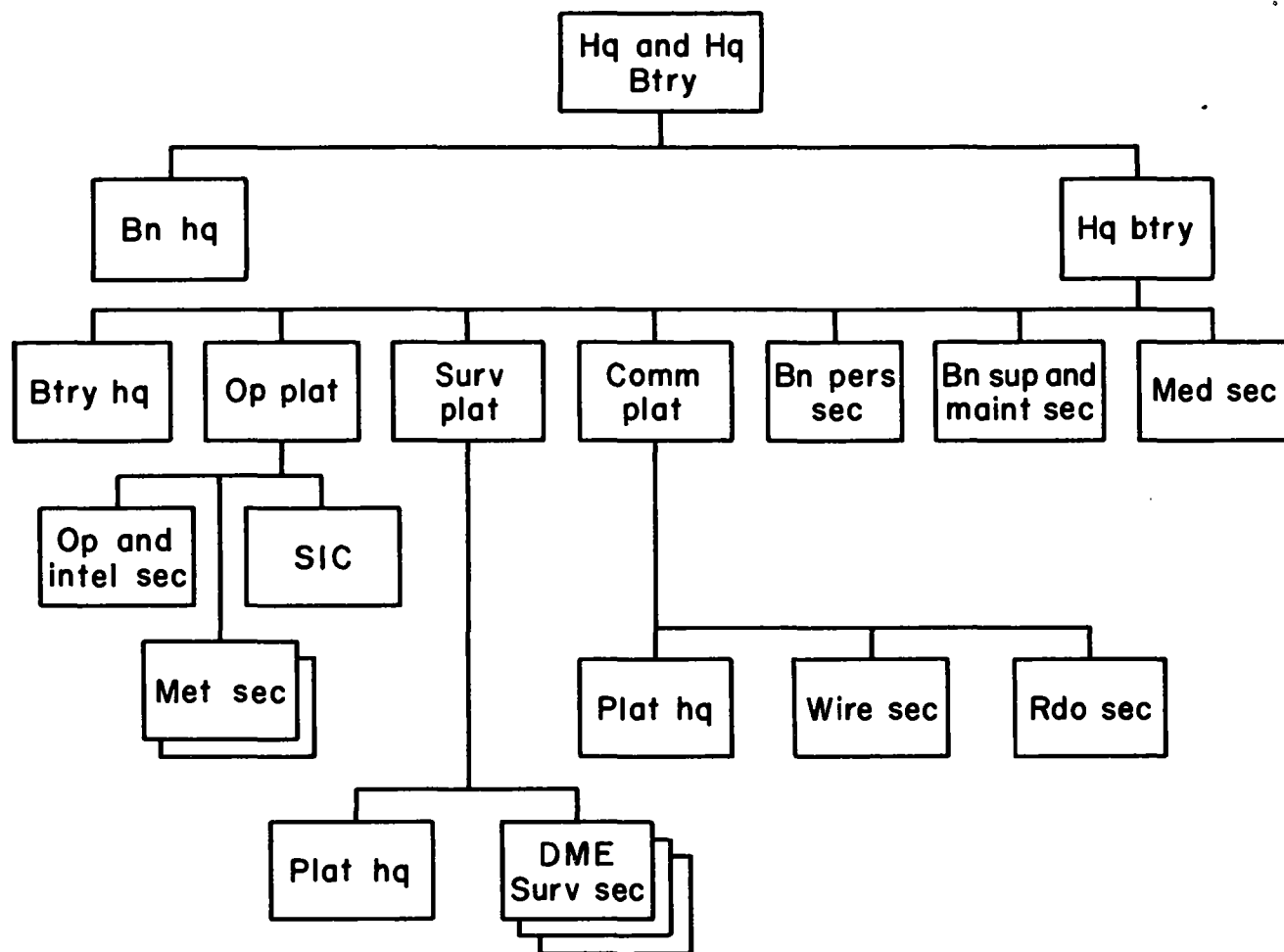


Figure 1-2. Headquarters and headquarters battery, field artillery target acquisition battalion (TOE 6-576).

h. Principal Duties of Key Personnel. The principal duties of key personnel of headquarters and headquarters battery are listed below:

Individual	Duties
BATTERY HEADQUARTERS	
Battery commander.	The battery commander of headquarters and headquarters battery has a dual function—battery commander and headquarters commandant. For duties of a battery commander, see FM 6-140. As headquarters commandant, he locates the elements of, organizes, and supervises the displacement of the command post.

Individual	Duties
First sergeant, battery clerk, mess steward, motor sergeant, and supply sergeant.	Supervises and coordinates the administration of the headquarters, including mess, transportation, and supply. Organizes local security. For duties, see FM 6-140.

*Individual**Duties***OPERATIONS AND INTELLIGENCE SECTION****Operations sergeant.**

Principal enlisted assistant to the S3. Assists the S3 in maintaining a record of all targets located by sound, flash, and radar. For additional duties, see FM 6-140.

Intelligence sergeant.

Principal enlisted assistant to the S2.

Works closely with the operations sergeant in matters of target location in order to maintain current counterbattery (mortar) records and general target information records. For additional duties, see FM 6-140.

METEOROLOGICAL SECTION**Ballistics meteorological technician.**

Acts as advisor to the battalion commander and to the corps artillery commander on meteorological matters.

Supervises, coordinates, and participates in the operations of the artillery meteorology sections.

Selects the operating area for the meteorology sections, and directs installation and operation of the sections.

Maintains close liaison with air weather service detachments, and with other artillery meteorology sections in the vicinity of his position.

Exercises technical supervision over the section.

Meteorological station chief.

Acts as principal assistant to the ballistics meteorological technician.

Supervises and advises computers, plotters, operators, and maintenance personnel on technical matters.

Meteorological equipment mechanic.

Supervises the operation of all equipment in the meteorology section.

Performs the authorized maintenance of meteorological equipment.

*Individual**Duties*

Chief meteorological computer, chief radiosonde operator, radiosonde operator, senior meteorological computer, radio operator, meteorological computer, meteorological plotter.

For duties, see FM 6-15 and AR 611-201.

SURVEY INFORMATION CENTER

Survey technician. The survey technician assists the battalion survey officer and is in charge of the survey information center (SIC).

Chief surveyor ---- Principal assistant to the survey technician. Maintains the survey operations map and survey control files.

Assists in the preparation of the corps artillery trig list and supervises the computing and checking of data performed by the SIC personnel.

Survey computer -- Acts as principal assistant to the chief surveyor and is capable of performing all of his duties. Performs survey computations as directed by the chief surveyor.

SURVEY PLATOON

Platoon commander. This officer plans and supervises the survey operations of the platoon and, in addition, acts as the assistant battalion survey officer. He performs duties as directed by the battalion survey officer.

Chief surveyor ---- Supervises, coordinates, and participates in survey operations. Acts as principal enlisted assistant to the platoon commander to facilitate rapid, accurate, and common survey control for artillery units. Instructs the members of the survey platoon in their duties.

SURVEY SECTION

Chief of survey party.	Supervises, coordinates, and participates in the operation of the survey party. Reconnoiters the area to be surveyed. Instructs members of the survey party in their duties.
Survey computer	Acts as principal assistant to the chief of the survey party and is capable of performing any or all of his duties. Performs survey computations independently during field operations and actively supervises the other survey computer.
Instrument operator.	Operates instrument in the field. Reads measured horizontal and vertical angles, and distances to recorder.
Survey recorder	Prepares accurate sketches and diagrams of the survey problem. Keeps an accurate record of survey information determined in the field.

COMMUNICATIONS PLATOON

For duties of the personnel of this platoon, see FM 6-10.

PERSONNEL SECTION

Personnel sergeant.	For duties of the personnel sergeant, see FM 6-140.
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BATTALION SUPPLY AND MAINTENANCE SECTION

For duties of the personnel of this section, see FM 6-140.

MEDICAL SECTION

Section sergeant	For duties of the section sergeant, see FM 6-140.
------------------	---

1-16. Target Acquisition Battery

Each target acquisition battery consists of a battery headquarters, processing section, communication platoon, survey platoon, sound ranging platoon, counterbattery radar platoon, flash ranging platoon, and liaison section (fig. 1-3).

a. Battery Headquarters. This headquarters commands, administers, and provides the support functions of mess, supply, and motor maintenance for the battery.

b. Processing Section. This section receives, processes and forwards target location information from battery elements.

c. Communications Platoon. This platoon establishes and maintains the battery's communication system (wire and radio), establishes a message center, and performs limited radio maintenance.

d. Survey Platoon. This platoon furnishes accurate survey control and support for battery installations and for other units as may be prescribed by the battery's mission.

e. Sound Ranging Platoon. This platoon performs target acquisition by means of sound ranging, and registers and adjusts friendly artillery.

f. Counterbattery Radar Platoon. This platoon performs target acquisition, and adjusts and registers the fires of friendly artillery by means of radar.

g. Flash Ranging Platoon. This platoon performs target acquisition by means of flash ranging, and adjusts the fires of friendly artillery. This platoon also performs comparative calibration of friendly artillery weapons.

h. Liaison Section. This section provides such liaison to the supported unit or other headquarters as may be directed by the unit commander.

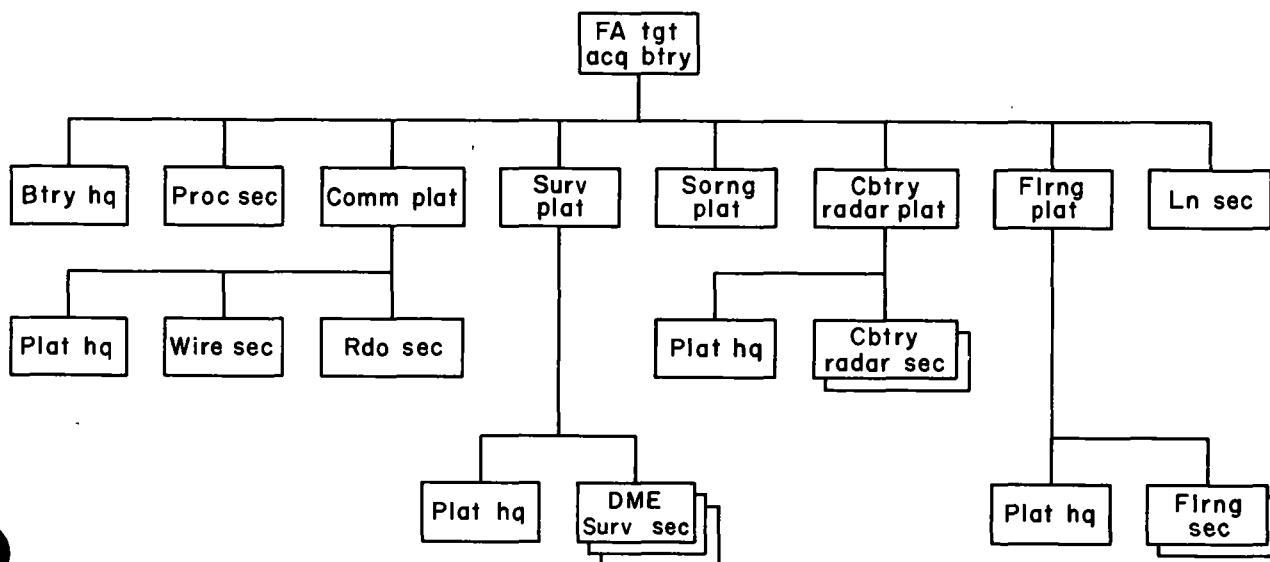


Figure 1-3. Field artillery target acquisition battery (TOE 6-577).

i. *Principal Duties of Key Personnel.* The principal duties of key personnel of the target acquisition battery are listed below:

Individual	Duties
BATTERY HEADQUARTERS	
Battery commander.	For duties of the battery commander, see FM 6-140. This officer does not function as headquarters commandant.
First sergeant, battery clerk, mess steward, motor sergeant, and supply sergeant.	For duties see FM 6-140.

Individual Duties

PROCESSING SECTION

Executive officer	--- This officer directs and supervises the operations of the battery processing section; plans all training within the battery under the direction of the battery commander; and establishes the location of the battery CP and processing section so as to best facilitate the receipt, processing, and transmission of target location information from battery elements.
Section chief	----- Acts as principal enlisted assistant to the executive officer; supervises the installation and operation of the processing section.

<i>Individual</i>	<i>Duties</i>
Draftsman plotter	Maintains the battery situation map; plots all incoming target acquisition and general battle-field information on the situation overlay.
Intelligence assistant.	Maintains a record of all intelligence data and target locations reported by battery elements and other agencies; performs other duties as directed.

COMMUNICATIONS PLATOON

For duties of the personnel of this platoon, see FM 6-10.

SURVEY PLATOON

Reconnaissance and survey officer.	Plans and supervises the survey operations of the platoon. Keeps the battery commander informed of all survey instructions received from the battalion survey officer.
Chief surveyor	Acts as chief enlisted assistant to the platoon commander. Instructs the members of the survey platoon in their duties. Supervises, coordinates, and participates in survey operations.

SURVEY SECTION

Chief of survey party, survey computer, instrument operator, and survey recorder. Four duties, see FM 6-140.

SOUND RANGING PLATOON

Platoon commander.	Supervises all sound ranging operations. Makes reconnaissance for and selects the sites of sound ranging installations. Coordinates with the communication and survey platoon to receive communication and survey support in the establishment of sound ranging installations. Advises the battery commander relative to sound ranging tactics. Supervises the sound ranging platoon training and administration. Maintains liaison with adjacent units to insure local security for the entire installation. Recommends displacement when appropriate.
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<i>Individual</i>	<i>Duties</i>
Sound chief	Carries out the instructions of the platoon commander relative to installation of sound outpost, base, and central, and assists in the selection of position. Supervises sound central operations. Instructs key personnel in individual duties and team operations. Performs administrative duties as chief of section.
Chief record reader.	Interprets and disposes of sound records. Performs duties of the sound chief when necessary.
Chief sound recorder.	Installs and supervises the care and maintenance of sound recording apparatus. Operates the sound recorder; relays the record obtained; and transmits the information to and from the outpost observers. Performs duties of the sound chief when necessary.
Senior sound observer.	Installs and operates the sound outpost. Activates the recording apparatus. Reports, when appropriate, information relative to hostile artillery. Performs battlefield surveillance. Adjusts artillery fire.

Sound computer	Makes entries and performs arithmetic operations on the sound plotting record. Determines time interval corrections with charts. Supervises the work of the sound observers. Informs sound observers of the friendly and enemy situation. Arranges for supplies for sound observers.
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FLASH RANGING PLATOON

Platoon commander.	Makes reconnaissance for the observation posts and the flash central for a flash base. Makes recommendations and advises the unit commander on the type of base required to properly cover the assigned zone of observation. Decides on the best method of survey to locate and orient each hasty base observation post.
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*Individual**Duties*

Maintains liaison with adjacent units to insure local security for the entire installation.

Supervises the training of the platoon.

Reconnoiters aggressively, prepares future plans, and recommends displacements when they become necessary.

Flash chief ----- Assists the platoon commander in reconnaissance, selection, and occupation of flash observation posts and the flash central.

Supervises the preparation of an overlay of the operations area.

Coordinates survey methods in the installation of the hasty base.

Verifies plotting and computations.

Evaluates flash reports and inspects records.

Trains members of the section in individual duties.

Flash switchboard operator. Serves as flash switchboard operator.

Installs, operates, tests, and maintains the flash switchboard. Relays orientation data from plotting team to observation posts.

Coordinates flash reports from observers.

Relays target data from plotting team to observers.

Enforces communication discipline.

Chief flash observer. Supervises the work of the flash observers to insure that the observation posts (OPs) of the flash base are installed at the proper location and are oriented properly.

Inform the flash observers of the friendly and enemy situation.

Flash computer --- Computes and verifies, during the initial installation of the base, short traverses, three-point resection problems, and azimuths for orientation of each OP. During operation of the base, he computes altitudes and checks azimuths on high-burst and mean point of impact registration.

COUNTERBATTERY RADAR PLATOON HEADQUARTERS

Platoon commander. Supervises all radar operations. Makes reconnaissance for and selects radar positions. Coordi-

*Individual**Duties*

notes the location of radars with the other locating elements in the battery.

Advises the unit commander of the capabilities and limitations of the radar sections under existing conditions.

Supervises the training of the platoon.

Controls displacement of radars to preclude both radars being moved at the same time and to insure maximum coverage of the assigned zone.

Warrant officer radar technician.

Supervises the repair and maintenance of radar equipment in the two radar sections.

Maintains necessary maintenance and supply records to insure normal operation.

Supervises and directs training of repairmen.

Platoon sergeant -- Assists the platoon commander in all phases of his duties. Due to the extended frontage of the assigned zone of observation, the radar chief frequently performs reconnaissance and selects radar sites.

Supervises and directs operation of the radar section and conducts section training.

Section chief ----- Supervises operator maintenance of the radar equipment. Evaluates the radar site after occupation of position.

Radar mechanic -- Performs organizational repair and maintenance of radar equipment.

Assists the warrant officer radar technician.

LIAISON SECTION

The duties of the target acquisition battery liaison section are similar to those of any artillery liaison section.

The target acquisition battery liaison officer does not however, act as fire support coordinator. For detailed duties of the liaison section, see FM 6-140.

CHAPTER 2

TACTICAL EMPLOYMENT

Section 1. PRINCIPLES OF EMPLOYMENT

2-1. General

The employment of the target acquisition battalion is directly related to the size of the corps area of responsibility and to the types of tasks assigned to the corps artillery. The battalion commander, in conjunction with the corps artillery staff, analyzes the requirement for target acquisition support and determines the most suitable employment of the target acquisition batteries. The meteorological and survey elements of headquarters battery are normally employed in general support of the artillery with the corps.

2-2. Capabilities and Limitations

In general, the limitations of sound and flash do not apply to radar. Conversely, the limitations of counterbattery radar do not apply to sound or flash. The overall efficiency of counterbattery intelligence is greatly increased by the ability of these agencies to reinforce and complement each other.

a. Sound Ranging. Sound ranging is valuable because of its ability to locate hostile artillery pieces which are hidden from visual observation and because it is a passive device which is not susceptible to electronic countermeasures. Sound ranging is very effective in fog since it does not require a clear line of sight to the target. The range of the sound set is approximately 20,000 meters. Maximum range is limited by the intensity of the sound with location accuracies of from 0 to 150 meters. Mountainous terrain may materially affect operations, depending on the relative ground contours in the area under consideration. Heavy firing by friendly artillery tends to confuse interpretation of the sound record. High winds impair accuracy.

b. Flash Ranging. Flash locations are extremely reliable and, under favorable conditions, the most accurate available means of locating targets. Flash ranging is limited in effectiveness, however, by unfavorable terrain and weather conditions which impair visibility. The flash ranging long base can range in depth up to the limit of visibility with location accuracies of from 0 to 50 meters.

c. Counterbattery Radar. Radar determines both range and direction to the target from a single position whereas sound and flash systems determine target locations essentially by the intersection of lines of direction from an array of well separated and multiple positions. The establishment of a radar position normally is much less time consuming than the installation of either sound or flash systems. Radar sets in current use are less affected by adverse weather than sound systems and are not so dependent on favorable terrain as flash systems. The counterbattery radar, AN/MPQ-10A currently authorized by the FATAB TOE is limited in its ability to locate conventional artillery firing low trajectories due to inherent countermortar design features. Heavy rain and snow will seriously reduce the radar range. Radar is also susceptible to electronic countermeasures.

d. The Survey Platoon. The target acquisition battalion survey platoons are capable of conducting extensive survey operations in the corps zone of action. Distance-measuring equipment (DME) elements of these platoons, employed either conventionally or using army helicopters, materially reduce the time required to extend survey control to each division artillery, each corps artillery battalion, and to the target acquisition batteries.

Section II. EMPLOYMENT

2-3. General

The target acquisition battalion is organized for combat and assigned missions that will provide the most effective target acquisition, survey, and meteorological support of the artillery with the corps. Target acquisition batteries normally are retained under battalion control; however, tactical considerations may dictate the attachment of a battery to a field artillery group or a division artillery.

2-4. Methods of Employment

a. General Support of Corps Artillery. When the artillery intelligence gathering capabilities of the corps are centralized, the FATAB normally will be employed in a general support role of the artillery with corps. The FATAB operations section normally is collocated with the corps artillery operations section. Thus employed, target information obtained by the battalion elements is transmitted direct to the corps artillery operations center where it is recorded, correlated, and available to be immediately acted upon. In this role, the target acquisition batteries' CPs normally are located in close proximity to the headquarters of an artillery group or a division artillery in order to facilitate future operations and provide access to the communication facilities of those headquarters.

b. Direct Support of Division Artillery or Field Artillery Group. While the FATAB normally is assigned a mission of general support, one or more of the target acquisition batteries may be assigned the mission of direct support of a division artillery or field artillery group. The battalion exercises a lesser degree of control of its batteries when they are assigned a direct support mission. Normally, the battery processing section is collocated with the supported unit operations center to facilitate rapid and timely reporting of all target and general intelligence information. This information is also transmitted to corps artillery by the supported unit and by the target acquisition (TA) processing section to the FATAB operations center. The battery will operate in the zone of action of the supported unit. This does not mean that the battery is restricted to the boundaries of the supported

unit for deployment of its platoons; but must be able to locate targets within the zone of action of the supported unit. The battery will displace on order of the FATAB unit commander or when ordered by the force artillery headquarters. The target acquisition batteries normally will be employed in direct support of division artillery under the following conditions:

- (1) When there is an exceptionally wide corps front.
- (2) In the offensive phase of combat.
- (3) During rapidly changing situations requiring timely displacement of elements to insure continuous target acquisition coverage.
- (4) When communications (terrain or distance) do not permit the FATAB commander to exercise full control of his batteries.
- (5) When the attachment of additional firing units to the artillery of a division generates a requirement for target acquisition support which exceeds the capability of the division artillery.

c. Attachment to Field Artillery Groups or Division Artilleries. When it becomes necessary to decentralize, the target acquisition batteries of FATAB will be attached to division artilleries or artillery groups. In this status, the target acquisition battery processing section is normally collocated with the supported artillery fire direction center (FDC) and the battery headquarters is located in close proximity. The processing section should maintain a situation overlay on which all target and battlefield information is plotted. The section maintains a record of all target locations which should also be transmitted to the FATAB operations section. Normally, FATAB batteries are attached only for a specific mission or operation. Battery survey operations are planned and integrated with those of the unit to which attached.

d. Attachment During Stability Operations. FATAB batteries may be attached to a defense force of a base or installation in order to provide general target acquisition.

Section III. DEPLOYMENT

2-5. Centralized Control

Depending on terrain, a target acquisition battery can operate on a front of up to 25,000 meters. Deployment of the batteries must be well planned and coordinated if the maximum effectiveness of the batteries is to be retained. The battalion command post is located where it can most efficiently control its batteries and, if possible, should also be located near the corps artillery command post.

2-6. Decentralized Control

a. The target acquisition battery is organized and equipped to execute all of the

missions of the battalion except the determination and furnishing of meteorological data, and the collection, evaluation, and dissemination of survey information, the latter being the responsibility of the division artillery SIC.

b. Due to the extended distances involved and the relatively independent operations of each section and observation post, maximum consideration must be given to decentralizing control. This must be emphasized in training to insure that each section chief can operate over extended periods of time with minimum supervision.

CHAPTER 3

RECONNAISSANCE, SELECTION, OCCUPATION, AND ORGANIZATION OF POSITION

Section I. GENERAL

3-1. Purpose

The purpose of reconnaissance, selection, and occupation of position (RSOP) is to move a unit from its present position area, rendezvous or bivouac area, or from a march, into a position from which it can effectively accomplish its mission. An established procedure for the reconnaissance and occupation of position is necessary in order to deploy the unit rapidly. It is neither possible nor desirable to lay down rigid rules for the composition of parties and the procedure to be adopted in every situation. Commanders are expected to make such modifications as the particular circumstances may require. Consideration of camouflage requirements is accomplished throughout RSOP.

3-2. Task Involved

Placing a battalion into position involves—

- a. Reconnaissance for battery positions; sound, flash, radar and meteorological installations; command posts; routes into positions; wire routes; radio and panel station truck parks; the aid station; and proximity to an entry point into the area communication system.
- b. Formulation of a plan for occupying the position selected.
- c. Issuance of orders to carry out the plan.
- d. Execution of the order, that is, the actual emplacement of the various elements of the battalion.

Section II. RECONNAISSANCE

3-3. General

Reconnaissance is aggressive and continuous. As soon as orders for the employment of the battalion are received, the battalion commander assembles the battery commanders and staff and issues instructions for the reconnaissance. Tentative battery positions and battalion installations are selected from a map reconnaissance. Because of the time and distances involved, the ground reconnaissance is generally decentralized so that it may be performed in a minimum length of time. The battery commanders, with their sound, flash, radar, communication, and survey officers, make a detailed ground reconnaissance for their installations. The position and type of sound base to be used, the location and type of flash installation, and radar positions, the

wire routes, radio and panel sites, the locations of command posts, flash and sound centrals, and the survey plan are determined from this reconnaissance. When engaged in stability operations, ground reconnaissance may not be possible because of security requirements, and air or map reconnaissance will be the method most often used.

3-4. Principles

a. *General.* The time allotted to reconnaissance generally is limited, and the procedure must be so organized that it can be accomplished as completely as possible in the time allotted. A map reconnaissance can be made at any time, but an air or ground reconnaissance is most effective during daylight hours. The size of the reconnaissance party usually

is restricted to a minimum. The remainder of the unit stays in position, bivouac, or rendezvous. If the situation permits, communication and survey personnel should be included in the reconnaissance echelon and be prepared to stay in the new position so that survey and the installation of communications can be started at once.

b. The Battery Commander's Party. When reporting to the battalion commander for reconnaissance instructions, the battery commander is accompanied by his party. The composition and loading of this party is based on the initial tasks to be performed and the

number of vehicles that the battery commander is authorized to take with him. Ideally, it should contain personnel and equipment to assist in reconnaissance, to initiate the establishment of observation, communication, and survey, and to guide the battery into its position. The following is an example of the minimum composition of the battery commander's party:

- (1) Sound, flash, and radar platoon commanders.
- (2) Communication officer.
- (3) Survey platoon commander with one survey section.

Section III. SELECTION, OCCUPATION, AND ORGANIZATION OF POSITION

3-5. Selection of Position

a. Position Areas. In general, the desirable characteristics of an area for a headquarters and headquarters battery are the same regardless of the type of artillery unit. See FM 6-140 for further details on the selection of an area for the headquarters and headquarters battery. Position areas for the batteries is largely dependent upon the characteristics of the target acquisition equipment.

b. Battalion Command Post. Communication with the batteries and supported units, security, and the tactical situation must be considered in selecting a location for the command post. In general, the battalion command post will be located centrally, but to the rear of the three batteries. The battalion command post is located in the vicinity of the corps artillery command post.

c. Battery Command Post. The battery command post generally is located in the center laterally and behind the sound, flash, and radar installations. The flash central and sound central are usually located in the center laterally and behind their respective installations. Local security, the tactical situation, and communication considerations determine the positions to be occupied. The selection of sound and flash bases and radar positions are discussed in FM 6-122 and FM 6-160, respectively.

3-6. Occupation and Organization of Position—General

After the reconnaissance and selection of position has been completed, survey and communication personnel commence preparing the new position. The battalion will remain in bivouac or continue to operate in its old position until ordered to displace. The battalion often displaces by battery or any element thereof. Installations are manned immediately, and normal operations are commenced as soon as possible.

3-7. Security

a. Ground Defense. Without interfering with the operation of the unit, the position is organized for security. Dispersal, camouflage, field fortification, establishment of machinegun positions, and posting of sentries are accomplished with the least possible delay by all personnel available. The organization of position begins when the position is selected, and continues throughout the occupation as opportunity permits. See FM 6-140 for further details on defensive measures. In addition, electronic security measures to be considered are covered in FM 32-5.

b. Defense Against Enemy Air Attack. All units must be prepared to participate in operations against air attacks. Planning should include the use of organic weapons to counter

the low altitude air threat. Nonair defense weapons in an air defense role are best employed by the use of the following established procedures:

- (1) *Rule for engagement.* In the absence of orders to the contrary, individual weapon operators will engage *attacking* aircraft; engagement of all other hostile aircraft will be on orders issued through the unit chain of command and supervised by unit leaders. The primary mission of the unit will not be jeopardized by these actions.
- (2) *Engagement of low speed aircraft.* In accordance with the rule for engagement, engage low speed enemy aircraft with aimed fire, employing the maximum weapon rate of fire. Aerial gunnery techniques generally applicable to all small arms and automatic weapons are presented in FM 23-65.
- (3) *Engagement of high speed aircraft.* In accordance with the rules of engagement, engage high speed enemy aircraft with maximum fire aimed well in front of the aircraft, and above its flight path, in order to force it to fly through a pattern of fire. This technique is not unaimed "barrage" fire, but requires a degree of aimed fire. It does not, however, call for careful estimation of aircraft speed and required lead.
- (4) *Massed fire.* Units should employ a massed fire technique when using small arms and automatic weapons in an air defense role.
- (5) *Use of tracer ammunition.* Automatic weapons should utilize the highest practicable proportion of tracer ammunition to enhance the deterrent or descriptive effect.
- (6) *Unit training requirements.* Training should include motivation and discipline, gunnery and aircraft recognition.

c. Defense Against Enemy CBR Attack. Defensive measures against a CBR attack generally follow those applicable to field artillery cannon units as set forth in FM 6-140.

A degree of protection is afforded target acquisition unit installations such as radar sites with their associated vans which may serve as temporary shelters. Unit CBR defensive measures are designed to allow friendly forces to operate successfully in a CBR environment. The objective of these measures is to enable the unit to continue its mission. Some of these measures are—use of alarm systems, wearing of protective masks, use of protective clothing and other protective equipment, use of protective shelters, dispersion of personnel and equipment, decontamination, and first aid. Standards of proficiency for operations while under a CBR attack are described in FM 21-40.

d. Warning System. An efficient warning system to provide early warning and information as to ground attacks, air attacks, parachute drops, air landings, and CBR attacks, is paramount. Target acquisition units are especially adapted to initial detection and measurement of enemy or unknown nuclear bursts. Using the nuclear, biological, chemical (NBC) reporting procedures, observation posts report this information in conjunction with the accomplishment of their primary mission. STANAG 2103 as implemented in FM 21-40 provides a format for reporting enemy or unidentified nuclear, chemical, or biological attacks. STANAG 2047 as implemented in FM 6-140 provides a standard method of disseminating emergency warnings of—

- (1) Ground attack.
- (2) Air attack.
- (3) CBR hazards.

3-8. Installations of Battalion Command Post

Elements of a field artillery target acquisition battalion command post are the headquarters, operations center, message center, switching central, and the radio and panel station.

a. Headquarters. The headquarters element consists of the battalion commander, executive officer, and communication personnel and equipment necessary to enable the battalion commander to supervise the battalion in the accomplishment of its mission. It must be located in a position which affords safety and security,

yet is accessible for personnel required to visit it.

b. Operations Center. The operations center consists of the S3, S2, and personnel and equipment of the operations section necessary to supervise the operations of the battalion. The operations center is a critical point in the communication system. All means of communication used for the transmission of tactical information and orders are centered in or near this installation. It is located where maximum safety and security are available and where interference and interruptions may be avoided.

c. Message Center. Message center consists of the senior message clerk and his assistant. It is located near the entrance to the command post area. All incoming and outgoing messages pass through it. For information concerning message center procedure, see FM 6-10.

d. Switching Center. The battalion switching central consists of the battalion switchboard and communication personnel necessary to maintain and operate the wire system. The switching central should be accessible to incoming wire crews. It should be located where maximum security is provided for operating personnel and where interference and interruptions may be avoided.

e. Radio and Panel Station. The radio and panel station includes the battalion base relative high-powered radio sets, an area suitable for panel displays, and a message pickup station for Army aircraft. For security reasons, it is located several hundred meters from the other elements of the command post, preferably on a flank. The radio sets may be detected by hostile intercept methods and thus become a target for hostile artillery. Radio sets at this installation may be connected to the appropriate elements of the command post by remote control. Wire communication is also established to this installation.

3-9. Organization of Battery Position Area

a. Headquarters and Headquarters Battery. Once the battalion command post area has been organized, battery elements such as mess, supply, and motor maintenance are organized to give maximum support to the command post. Other battery installations such as

the two meteorology sections normally are located elsewhere in the corps area. Depending upon the desires of the commander, the service platoon may or may not be located in the headquarters battery area. The survey information center should be located near the corps artillery fire direction center. In certain types of operations, it may be desirable or necessary to establish a rear echelon where the personnel section, supply, and maintenance activities would be located.

b. Target Acquisition Battery Command Post. The battery command post is organized in the same manner as the battalion command post. The battery administrative section usually is located near the battery command post. When the battalion is employed in general support of the corps, the battery command post should be near a division or group artillery headquarters to facilitate exchange of information and future operations.

c. Flash and Sound Centrals. The flash and sound centrals provide their own local security since these positions may be at some distance from the battery position area. Security measures are adapted to the situation. If possible, the central should be within a friendly perimeter. Cover and concealment measures are taken to fit the situation.

d. Counterbattery Radar. The radar positions normally provide their own local security. Since these positions may be some distance from the battery command post, the radars should be located within or near a friendly force if possible. Cover and concealment measures are taken to fit the situation.

e. Observation Posts. Observation posts are dug in and protected by overhead cover and concealment to the maximum extent possible in the time available. Defense measures are primarily passive measures such as concealment and digging in. The observation post is of little or no value if the enemy discovers it. Extreme care must be taken to keep it hidden. Only as a last resort will the personnel engage in active defense with small arms fire. Vehicles are kept well away from the observation post. They must be concealed and normally are placed in defilade. Radios are emplaced away from the observation posts. Remote kits are used for operations. The posi-

tion selected for the radio must afford line-of-site transmission to the control area for all FM equipment. This may be accomplished by

the use of elevated antennas. Observation posts should be located within a friendly perimeter if possible.

CHAPTER 4

COMMUNICATION

4-1. General

a. All available means of communication must be utilized. No one means is considered primary or relied on exclusively. The field artillery target acquisition battalion employs wire, radio (AM and FM), and messenger communication. Sound and visual means may also be employed as appropriate. In all communication systems, adequacy, reliability, and flexibility are prime considerations in their establishment and maintenance. These same considerations apply within this battalion.

b. The dispersion of this battalion on the battlefield requires maximum utilization of the area communication system between the battalion headquarters and the batteries. It is desirable for the area system to provide a minimum of one sole-user circuit from the battalion to each battery.

4-2. Communication Systems

For detailed discussion of communication systems, see FM 6-10.

CHAPTER 5

TARGET ACQUISITION MEANS AND ASSOCIATED OPERATIONS

Section I. SOUND RANGING

5-1. General

Sound ranging is the procedure used in determining the source of a sound, such as a gun firing or a shell burst, by measuring the relative arrival times of the sound wave at several accurately located microphones. The difference in arrival times of the sound at the accurately located microphones permits the location of the sound source by the intersection of lines of direction established from three or more microphones.

a. Missions of the Sound Ranging Platoon. The following missions are performed by the sound ranging platoon:

- (1) Location of hostile artillery.
- (2) Registration and adjustment of friendly artillery.
- (3) Collection of battlefield information.

b. Basic Theory of Sound Ranging. The discharge of a gun or burst of a shell causes a sound disturbance or pressure vibration of the air, lasting for only a fraction of a second. The impulse so produced travels outward through the air in all directions at speeds which are dependent upon weather conditions. The speed of sound varies from 330 to 350 meters per second at average air temperatures. If there is no wind and the entire mass of air has a uniform temperature of 10° Centigrade (50° Fahrenheit), the velocity of the advancing wave front is 337.6 meters per second. These are the standard conditions used in sound ranging. Since these conditions seldom if ever exist, certain meteorological corrections must be applied. The meteorological sections located in headquarters and headquarters battery normally provide an electronic meteorological message. However, the sound

platoons are equipped to take a visual meteorological message when the meteorological sections are not available. In still air, the sound wave will arrive at two given points at the same time if their distances from the source are equal, that is, if the source of the sound lies on the perpendicular bisector of the line connecting the two points. For a source in any other position, the arrival times at the points of observation will be different. This time difference increases as the distance of the sound source from the perpendicular bisector increases. It provides a measure of the angle between the perpendicular bisector and a ray through the sound source extending from the midpoint of the line connecting the two observation points. If two microphones are placed some distance apart and the difference in arrival time of a sound at each microphone is recorded, the direction of the ray which passes very close to the origin of the sound may be determined. Other combinations of two microphones will provide similar rays, and from the intersection of these rays the source of sound may be located.

c. Sound Base. In practice, a sound wave is detected by an array of four to six microphones, normally spaced at equal intervals (700 or more meters) along a straight line or, under certain conditions, along the arc of a circle. In some cases the microphones may be spaced at unequal intervals along a straight or broken line. Such an array is termed a *sound base*. A straight line segment connecting a part of adjacent microphones constitutes a *subbase*. For more detail, see FM 6-122.

d. Recording. Each microphone is connected by a wire or radio circuit to the sound re-

cording set located at the *sound ranging central* (SRC). The sound impulse received at each microphone is recorded by this equipment on a moving paper tape. Recorded sound impulses are called *breaks*. In front of the sound base, one or two outpost observers are placed in a position so that the sound wave will hit 2 seconds prior to hitting any microphone. Either observer, upon hearing a sound of a gun or shell burst, must activate the sound recording apparatus in time to record the sound.

e. Sound Record. The sound record is a paper tape upon which a time scale is printed and the arrivals of the sound impulse at each

microphone are recorded. The time of arrival at each microphone, as measured from an arbitrary zero time, is read from the record, and the difference between arrival times is computed for each pair of adjacent microphones.

f. Plotting. The intersection of the rays from the midpoints (or geometric center of a polygon of error) gives the location of the sound source. The accuracy of the location is increased by application of certain corrections to the computed time differences.

5-2. Sound Ranging Base Computations

For the technical discussion of sound ranging computations, see FM 6-122.

Section II. FLASH RANGING

5-3. General

a. Use. Flash ranging is the procedure employed in locating points in the target area by visual observation and intersection from two or more observation posts. The flash platoon is employed to perform the following five missions:

- (1) Location of hostile artillery.
- (2) Registration and adjustment of friendly artillery.
- (3) Collection of battlefield information.
- (4) Perform comparative calibration of friendly artillery.
- (5) When required, verify the location of nuclear bursts fired by friendly forces.

b. General Description.

- (1) Flash ranging installations are of two general types—rapid and deliberate. In a rapid installation, two observation posts and a small plotting center are connected by wire, radio, or both; they are not necessarily tied to survey control. Deliberate installations consist of three or more surveyed observation posts and a plotting center, connected by wire, radio, or both. Selection of the type of installation to be employed is governed by the situation. A deliberate installation may be developed using observation posts from rapid installations.

- (2) In either type installations, each observation post is equipped with an observing instrument for reading horizontal and vertical angles. In a rapid installation, the instruments are oriented to measure angles to points in the target area. In a deliberate installation, they are oriented to measure azimuths. In rapid installations, the instrument of one observation post is oriented with reference to the companion observation post. In deliberate installations, observing instruments normally are oriented on grid north. The observers, having sighted a target, report its instrument reading (or azimuth) to the plotting center. If the readings are from a deliberate base, the position of the target is plotted. If the readings are from a hasty base, the range and direction to the target are computed.
- (3) Verification of the location of friendly delivered nuclear weapons is accomplished by taking readings to the stem approximately 15 seconds after detonation. Determination of the occurrence of a contaminating burst will be by observation of the fireball position with respect to the ground, using suitable filtered goggles. Burst data from friendly delivered weapons will be forwarded

through the battalion S3 to the appropriate higher headquarters.

5-4. Rapid Installations

In rapid installation, target location is based upon the solution of oblique triangles. A baseline which is very short in proportion to the ranges sought is established. (This is a target area base as described in FM 6-40.) The length of the base is expressed in meters. Angles to targets are measured from the observation posts which have been established at the ends of the base, and the resultant triangles are solved using the trigonometric sine law

5-5. Deliberate Installations

When all observation posts are located and oriented on a common grid and when adequate communication is established, a deliberate installation exists. Locations of targets and points in the target area are determined by plotting the grid azimuth to the target from each observation post.

5-6. Flash Ranging Computations

For the technical discussion of flash ranging computations, see FM 6-122.

Section III. COUNTERBATTERY RADAR

5-7. Missions

The primary mission of the radar sections is the location of artillery. Other missions include—

- a. Adjustment and registration of friendly weapons.
- b. Position fixing and vectoring of light army aircraft.
- c. Provide radar survey to artillery weapons and orient lost patrols.

5-8. Basic Theory of Pulse Radar

a. The functioning of all radar equipment involves the following four basic steps:

- (1) A radio signal is sent out (transmitted).
- (2) The transmitted signal strikes an object.
- (3) The transmitted signal is reflected in all directions from the object.
- (4) An infinitesimal part of the reflected signal returns to the radar and is received by the receiver.

b. The interval of time between transmission of the signal and reception of the echo is dependent upon the distance from the radar to the object. In radar terminology, this distance is called range. Since all radio signals travel at a constant speed of approximately 300,000 kilometers per second, the distance to a reflecting object can be found by measuring the time required for the signal to reach the reflecting object and return to the radar set. High frequency radio energy pulses of ex-

tremely short duration are transmitted at regular time intervals. This time interval is adequate to permit an echo from a particular transmitted pulse to return from the maximum range of the radar before another pulse is sent out or transmitted. Radar antenna systems are directional and by utilizing these directional characteristics, it is possible to determine azimuth and elevation to a reflecting object. Thus, azimuth, elevation, and range from the radar to a reflecting object may be determined.

5-9. Weapons Location

a. The radar sections of the target acquisition battery are currently equipped with the AN/MPQ-10 radar. This is a tracking-type radar which detects the projectile at a point on the ascending leg of the trajectory and tracks it through a subsequent portion of the trajectory. The tracked portion of the trajectory as recorded by the recorder, RD-54, is extrapolated manually to the point of origin.

b. Prior to detection, the radar section is assigned a horizontal sector of search of from 200 to 800 mils. In order to cover the assigned sector, the radar mechanically scans the area with the beam at a constant elevation. When an artillery weapon is fired, the echo from the projectile as it passes through the scanning radar beam will be shown on the detection scope (B-scope) of the radar. Following the appearance of the echo, the control unit operator causes the radar to cease sector scan and manually positions the radar to observe

the spot where the echo appeared. At this point, the first phase of weapons location is completed.

c. The operator next directs his attention to the J-scope. When a subsequent round is fired from the same weapon, or a different weapon in the same area, the projectile will again enter the radar beam. The echo will now appear on the J-scope. At this time, the operator causes the radar to automatically track the projectile. It should be noted that the assigned sector of search cannot be observed during the time the radar is awaiting subsequent rounds, as the radar can only handle one location at a time.

d. While the radar is automatically tracking the projectile, it continuously measures slant range, azimuth, and elevation from the radar to the projectile. Slant range and elevation are converted by the radar to horizontal range and height. These data, along with azimuth, are transmitted to the recorder RD-54. The recorder plots the data as continuous traces on moving paper. The plots produced do not re-

veal the weapon location. A parabolic template is used to extend the traces toward their origin, a plot reading scale is placed over the plots, and the trial range and azimuth to the weapon are determined. Actual weapon location is determined from a contour map by successive approximations.

e. The maximum effective tracking ranges for the AN/MPQ-10A as shown are approximate and based on average conditions:

- (1) Light mortars
(60mm) ----- 6,500 meters
- (2) Medium mortars
(81mm) ----- 7,500 meters
- (3) Heavy mortars (4.2) - 7,000 meters
- (4) Light artillery ----- 8,000 meters
- (5) Medium artillery ---- 9,000 meters
- (6) Heavy artillery ----- 11,000 meters
- (7) Very heavy
artillery --- 12,000 to 18,000 meters

f. See FM 6-160 for more information on the AN/MPQ-10A.

Section IV. SURVEY

5-10. General

Corps artillery survey operations are performed by the field artillery target acquisition battalion assigned to each corps artillery. The battalion commander of the target acquisition battalion is the corps artillery survey officer. The battalion survey officer is responsible to the battalion commander for planning and supervising the battalion survey operations which include placing the artillery with the corps (and other units requiring survey control) on a common grid. When engineer survey assistance is required, a request should be forwarded to the corps engineers through the corps G-2. Also included in survey operations are the collection, evaluation, and dissemination of survey information for all artillery surveys executed in the corps area to a prescribed accuracy of fourth order or greater. Surveys performed by the target acquisition battalion are executed to a prescribed accuracy of fourth order.

5-11. Survey Mission

The survey mission of the target acquisition battalion is to provide survey control to each of the following:

a. *Division Artillery.* A type army corps consists of four divisions. Depending on the tactical situation and the deployment of units in the corps area, the target acquisition battalion will normally be required to extend survey to two to four division artillery survey control points. The establishment of these survey control points requires that direction be provided at each control point:

b. *Corps Field Artillery Battalions.* The target acquisition battalion is responsible for extending survey control to each field artillery battalion operating in the corps area as corps artillery. The survey requirement for these battalions is a survey control point established within approximately 1,000 meters of the position area, with direction provided from the survey control point to an azimuth mark.

c. *Microphones in the Sound Base.* The target acquisition battalion must locate by survey each microphone in each sound base. Since each target acquisition battery establishes a 6-microphone base and is capable of establishing two bases, a total of 36 microphones may have to be located by survey.

d. *Flash Observation Posts (OP) in the Flash Observation Base.* The target acquisition battalion must locate by survey each flash observation post in the flash observation bases. Since each target acquisition battery normally establishes 4 flash observation posts, a total of 12 observation posts must be located by survey and provided with directional control.

e. *Radar Installations.* The target acquisition battalion must provide survey control to each organic radar installation of the target acquisition battalion, a total of six installations.

f. *Meteorological Sections.* The target acquisition battalion must provide survey control to both organic meteorological sections of the target acquisition battalion. When large-scale maps are available, the survey section is required to furnish a grid azimuth from the orienting station to an azimuth mark. When large-scale maps are not available, the survey section provides the grid coordinates and height of the orienting station in addition to the grid azimuth to an azimuth mark.

g. *Other Units and Installations as Required.* The target acquisition battalion must provide survey control to additional units and installations designated by the corps artillery commander. Survey control points may also be required for searchlight batteries (platoons) in areas for which maps are not available.

5-12. Survey Information Center

a. A corps survey information center (SIC) is established and maintained by the survey information center personnel of headquarters battery. Usually it is located in the vicinity of the corps artillery fire direction center and is the agency for collecting, evaluating, and disseminating survey data. Dissemination is accomplished by preparing and distributing trig lists and by furnishing survey information to units upon request.

b. Files of all survey control (fourth order or greater) existing in the corps area and files of tie-in points established in adjacent corps areas by the target acquisition battalions or division artilleries in those areas are maintained in the survey information center. These files consist of trig lists obtained from the corps engineers, trig lists published by target acquisition battalions operating in adjacent corps areas, and data for each survey control point established by the battalion survey parties and by the parties of the division artillery headquarters with the corps.

c. An operations map is maintained in the SIC which shows the location of all existing trig points and survey control points and the schemes of completed surveys. Overlays to the map show the survey operations that are currently being performed by the survey personnel of the target acquisition battalion and by artillery with the corps.

d. In addition to performing the functions of the SIC discussed in *a* through *c* above, SIC personnel assist the survey operations of the target acquisition battalion by computing and checking data in the following areas:

- (1) Checks of field records and computation of field parties.
- (2) Adjustment of traverses.
- (3) Conversion of survey data to the corps grid when survey operations have been performed with assumed data.
- (4) Transformation of coordinates and grid azimuths.
- (5) Conversion of coordinates—geographic to grid and/or grid to geographic.

5-13. Target Acquisition Battalion Survey Operations

a. The battalion survey operations are conducted in two phases—an *initial phase* and an *expansion phase*.

b. The survey operations conducted during the initial phase consist of those necessary to establish a survey control point for each division artillery, each corps artillery battalion, and to each target acquisition battery (fig. 5-1). The corps engineer topo company estab-

lishes third order control points throughout the corps area as requested by the corps artillery survey officer.

c. Survey operations of the target acquisition battalion during the expansion phase consist of establishing a basic control net throughout the corps area. From stations of the basic net, control is then extended so as to provide survey control throughout the area. The ultimate goal is a survey control point within 1,500 to 2,000 meters of every possible artillery position (fig. 5-2). This goal is accomplished to the extent permitted by the time available.

d. Survey operations of the target acquisition battalion are continuous. The amount of survey performed in any area of operations depends on the length of time that the corps remains in the area. When the corps is moving rapidly, the battalion may be able to perform only the initial phase survey operations. When the corps remains in one area for an extended time period, the target acquisition battalion conducts expansion phase survey operations.

e. For a complete discussion of survey methods and computations, see FM 6-2.

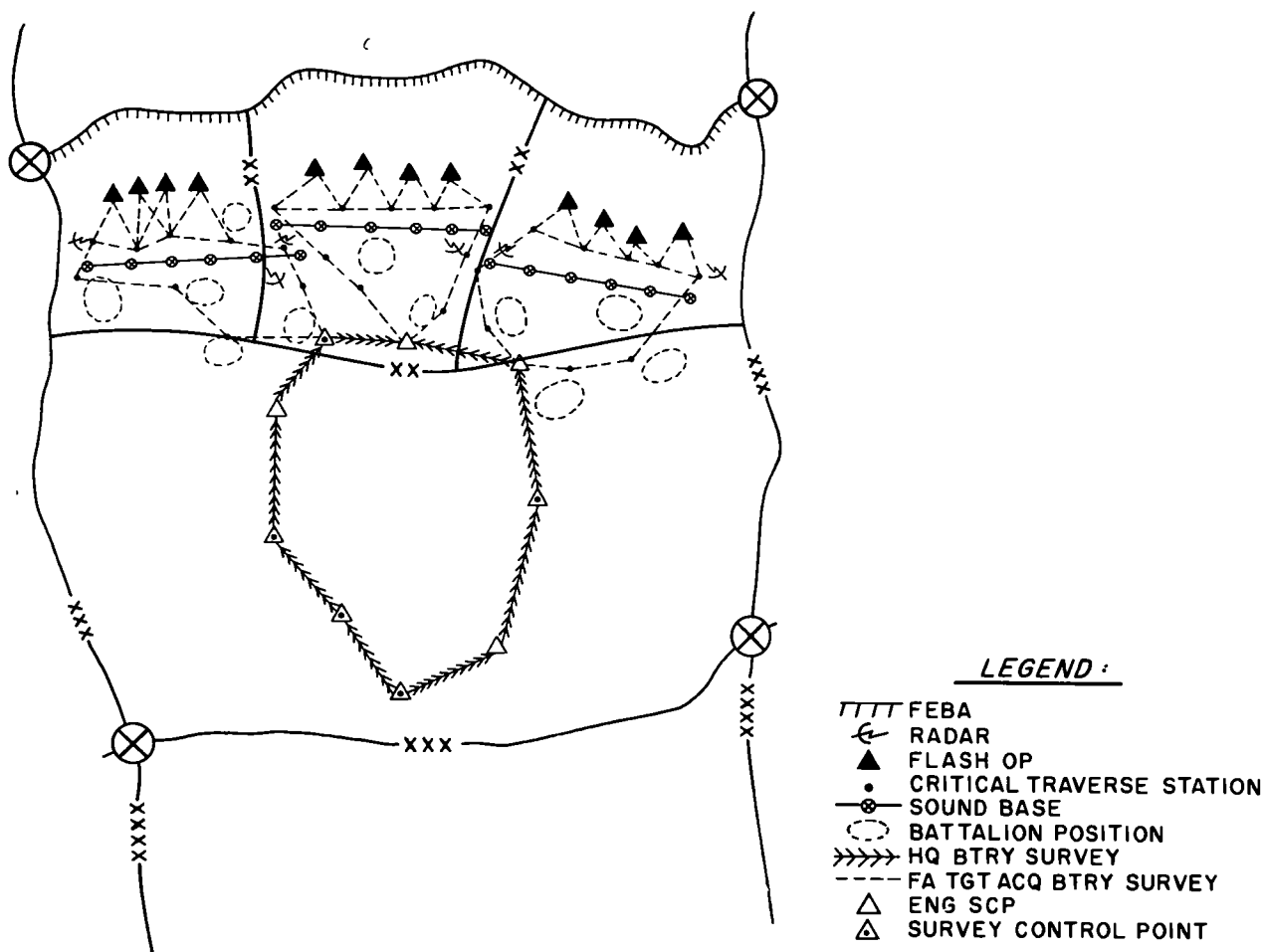


Figure 5-1. Target acquisition battalion survey operations during the initial phase.

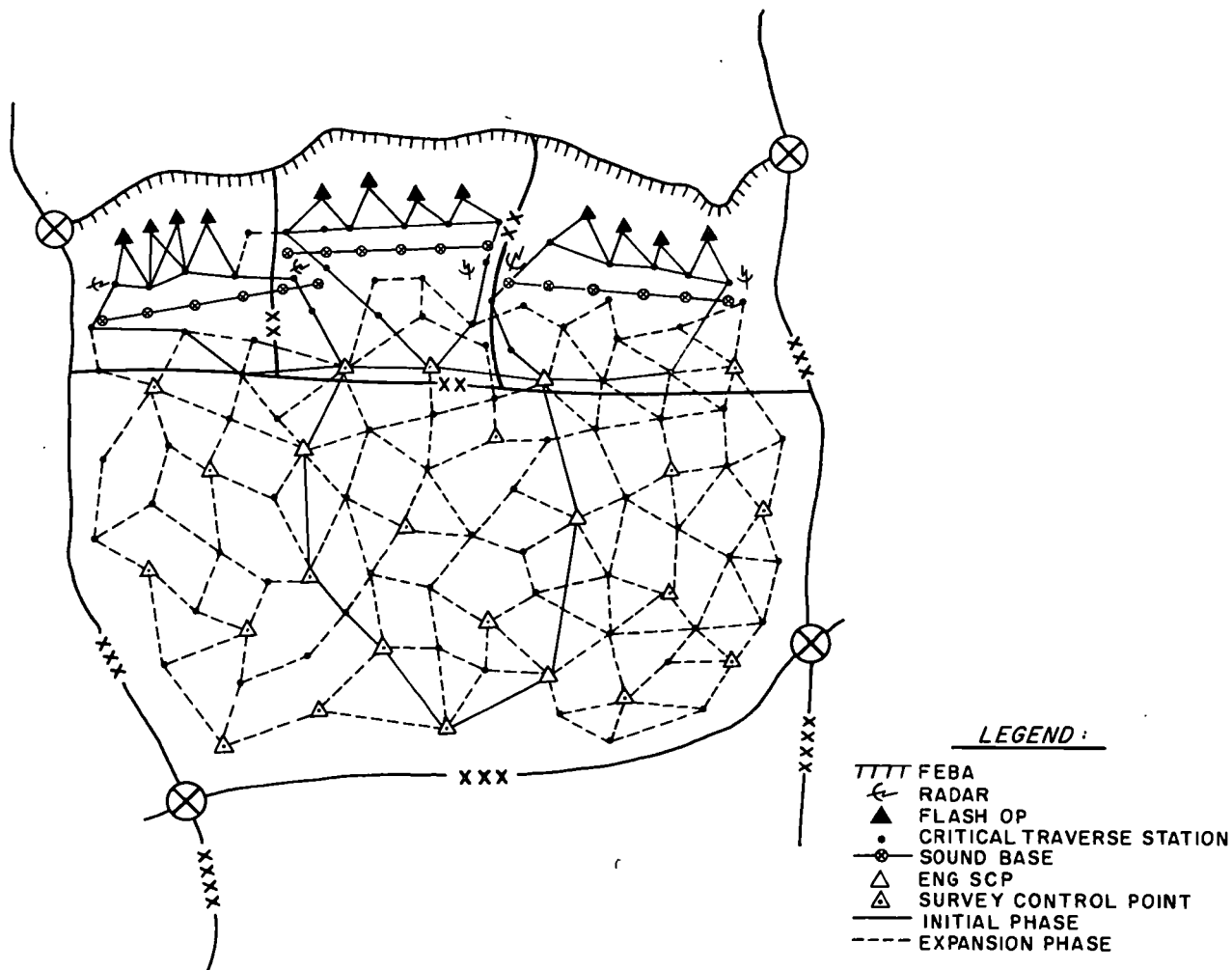


Figure 5-2. Target acquisition battalion survey operations during the expansion phase.

5-14. Target Acquisition Battery Survey Operations

a. The survey operations performed by a target acquisition battery survey platoon during the initial phase consist of the survey necessary to locate the target acquisition battery installations that require survey control and to provide survey control points for division artillery and each corps artillery battalion in the battery area of responsibility (fig. 5-1). These operations include the closure and check

of all work performed and the establishment of a declination station in the division area.

b. During the expansion phase, the survey platoons of the battalion are assigned tasks by the battalion survey officer as necessary to accomplish the required survey operations. The survey platoon of each battery should be assigned tasks in areas as near as possible to the battery area of responsibility to facilitate future operations.

Section V. METEOROLOGY

5-15. General

The wide dispersion of army forces on the modern battlefield and the sophistication of current weapon systems have increased the Army's requirements for information on atmospheric conditions. This information can be broken down into two general areas—information concerning weather and climate, and artillery meteorological data. Information concerning weather and climate encompasses weather forecasts, weather summaries, and climatological reports required for military tactical and strategic operations. Meteorological data furnished by FATAB include ballistic and computer met messages, sound ranging messages, wind information for fallout prediction, atmospheric data for the Air Weather Service detachments with the field army, pressure data for missiles, and low-level wind data for rockets.

5-16. Mission

The mission of the meteorological sections is to—

- a. Provide ballistic and computer meteorological messages to artillery firing units for use in correcting firing data for existing non-standard weather conditions.
- b. Provide meteorological messages to the sound platoons of the target acquisition battalion for determining corrections in sound locating data resulting from existing nonstandard weather conditions.
- c. Provide wind data for fallout prediction.
- d. Provide weather information as requested by air weather service units.

5-17. Organization

Two meteorological (met) sections are organic to the target acquisition battalion and are an element of the headquarters and headquarters battery. Each section is composed of 1 warrant officer and 17 enlisted personnel. For continuous operation, the section usually is divided into two 8-man teams. The chief of section assists the met officer in continuing operations and the radio operator is primarily responsible for message transmission.

5-18. Artillery Meteorological Sections

Within each field army there is a network or artillery meteorology sections which exist for the purpose of conducting atmospheric soundings and disseminating current meteorological data. Each division artillery has one meteorological section; and the corps FATAB has two. Thus, a 12-division, 3-corps field army has at least 18 met sections continuously processing atmospheric data. Although they are an additional source of weather data, these sections are not trained or equipped to perform weather forecasting.

5-19. Staff Supervision

a. The weather services provided to the field army by the air weather service are accomplished under the staff supervision of the intelligence officer at each echelon. This weather support is outlined in paragraph 5-25.

b. Ballistic meteorological data produced by artillery meteorological sections is not classified as intelligence weather data. Artillery meteorological sections are part of the artillery weapons system, and their operations and activities, to include communications and scheduling required for dissemination of meteorological messages, is accomplished under the staff supervision of the operations officer at each echelon.

c. A meteorological quality control team is located at each corps artillery to examine samples of the data evaluated by the met sections assigned to a corps. This team is supervised by the corps artillery meteorological staff officer who normally is the assistant S-3, corps artillery. The general duties of this team and the staff officer are as follows:

- (1) Corps artillery meteorological quality control team.
 - (a) Examine random samples of the data obtained by met sections assigned to the corps and evaluate the data.
 - (b) Perform inspections of all met sections in the corps area at the direction of the corps artillery commander and under the supervision

of the corps artillery met staff officer.

- (c) Provide assistance to all met sections in the corps area concerning problems of maintenance, training, and supply.
- (2) Corps artillery meteorological staff officer.
 - (a) Advises the commander and staff on all aspects of ballistic meteorology, to include the organization, capabilities, procedures, and effectiveness of the artillery met sections of the corps.
 - (b) Coordinates the upper air soundings within the corps area to insure the acquisition of valid data from a comprehensive meteorological network.
 - (c) Makes plans and recommendations pertaining to requirements for, and employment of, artillery met sections within the corps area.
 - (d) Exercises technical supervision over artillery met training and supply throughout the command.
 - (e) Supervises the activities of the met quality control team.

5-20. Capabilities and Equipment of Meteorological Sections

a. The met sections of the target acquisition battalion have the capability of sounding the atmosphere up to 30,000 meters, day or night. The limiting factors are severe surface winds and the period of time required for a sounding balloon to ascend. Low altitude soundings can be made every 2 hours. The higher altitude soundings require a reduction in frequency to about every 3 hours. Ballistic messages for light artillery can be produced in 30 minutes. The minimum time required to produce a fall-out message is about 2 hours. In the event of failure of electronic equipment, sections have the capability of measuring upper air winds by pilot balloon (visual) observation and predicting upper air density and temperatures using climatological tables. Sections are further capable of reporting a variety of parameters, such as the discomfort index, wind chill factor, and surface winds.

b. For major items of equipment, see FM 6-15.

5-21. Ballistic Meteorological Messages

a. Ballistic weather data for corrections in firing data are furnished to artillery firing units by the meteorological sections in the form of a ballistic meteorological message. This message includes—

- (1) Ballistic wind speed and direction.
- (2) Ballistic air temperature.
- (3) Ballistic air density.

b. For the techniques involved in obtaining raw data and computing and encoding ballistic meteorological data, see FM 6-15.

5-22. Computer Meteorological Messages

a. Messages showing the effects of non-standard weather conditions applicable to the FADAC computers can be obtained by the meteorological section. These messages are known as "Computer Met Messages." This message includes *true values* of—

- (1) Wind direction (10's of mils).
- (2) Wind speed (knots).
- (3) Air temp ($1/10^{\circ}$ K).
- (4) Air Density (GM/M³).

b. For the techniques involved in obtaining the data for encoding the complete met message, see FM 6-15.

5-23. Meteorological Messages for Sound Ranging

a. The data necessary for the correction of errors in sound plots resulting from variations in existing atmospheric conditions are furnished to sound ranging platoons by the meteorological sections in the form of sound ranging meteorological messages. This message includes—

- (1) Effective wind speed.
- (2) Effective wind direction.
- (3) Effective air temperature.

b. For the techniques involved in obtaining raw data and computing and encoding sound ranging weather data, see FM 6-15.

5-24. Wind Data for Fallout Prediction

For the techniques involved in obtaining

raw data and computing wind data for fallout prediction, see FM 6-15.

5-25. Air Weather Service Support Within the Field Army

a. By joint regulation, the Air Weather Service (AWS) of the U. S. Air Force provides units properly organized, equipped, and trained to fulfill the requirements of the Army for weather forecasts, weather summaries, and climatological reports. Forecasts are prepared by AWS for the Army on both a routine and a special basis. Routine forecasts normally cover periods of 24 hours, 48 hours, and 3 to 5 days. Forecasts are based on the information forwarded to the air weather service forecast section with the field army by the worldwide weather facilities of the AWS and on local meteorological data collected within the field army area by both AWS personnel and artillery meteorological sections.

b. The AWS support of the field army is accomplished through an Air Force staff weather officer (SWO) at division, corps, and army headquarters. Each SWO is supported by an AWS detachment which includes both observers and forecasters. Communication support to include both teletypewriter and facsimile circuits is provided to the AWS detachment by the signal unit organic to the supported command. The SWO operates under the staff supervision of the G2, and, at corps and division headquarters, he is also the AWS detachment commander. He advises the commander and his staff on matters related to weather and climate. He arranges, through AWS channels, for climatological studies and summaries as required, coordinates the delivery of routine and special forecasts, and serves as the liaison officer between the AWS detachment and the Army element.

5-26. Dissemination of Meteorological Data

Due to the temporary nature of current meteorological information, timely distribution of meteorological messages is essential. Meteorological data is transmitted by using a corps artillery met net or radioteletype circuits such as the corps and division artillery command/fire direction nets (RATT).

5-27. Employment

The meteorological sections of the target acquisition battalion normally will be employed as prescribed by the standing operating procedure (SOP) of corps artillery or higher authority. Since one of the missions is providing wind data for fallout prediction, the SOP followed usually will dictate that one of the meteorological sections be employed to support army elements engaged in the prediction of fallout. For detailed instructions, see FM 6-15. The remaining section is employed in support of the artillery with the corps.

5-28. Selection of Section Position Areas

a. The meteorological section is located most conveniently from a command, communication, and administrative point of view in the vicinity of the target acquisition battalion command post. However, the employment of the battalion met sections as discussed in paragraph 5-29 will in most situations preclude such location.

b. The forward met section should be located where it can best supplement the division artillery met sections, and where it has access to the corps artillery command and fire direction radioteletype net. Since messing and local security must also be considered, locating the section in the vicinity of a division artillery headquarters or a target acquisition battery headquarters is desirable.

c. The rear met section will be concerned mainly with providing wind data to army elements engaged in the prediction of fallout. Its location, while not as critical as the forward section, is still subject to the same considerations. The rear section can be located in the vicinity of any command post area that has communication facilities to either the Field Army Tactical Operations Center (FATOC) or the Corps Tactical Operations Center (CTOC).

5-29. Minimum Requirements of Position Areas

Whenever possible, the following minimum requirements should be met: a level area of cleared land for the main balloon assembly and launching site, no obstructions within a

distance of 200 meters, and no objects on the horizon above an angle of 3°. In almost all instances, the position selected for the met section will be one which is a compromise be-

tween this ideal location and the tactical requirements. For a detailed discussion of the requirements for employment of the main components of the met section, see FM 6-15.

Section VI. LIAISON

5-30. Liaison

a. The corps artillery FDC and battalion operations section should normally be collocated. Personal liaison should be established with corps artillery by the battalion commander or officer designated by him since no liaison officer is authorized by the battalion TOE. If FATAB and corps artillery are widely separated, a representative of the battalion commander will remain at corps artillery. Normal exchanges of information, as applicable, are conducted by this officer who is appointed by the battalion commander. For type information, see paragraph 5-31.

b. When a battery is operating under decentralized control, the battery will be responsible for maintaining liaison with the supported unit.

5-31. Liaison at the Battery

The duties of the target acquisition battery liaison section are similar to those of any other artillery liaison section. The target acquisition battery liaison officer does not however, act as fire support coordinator. The liaison officer, in addition to the executive officer, needs formal training in target acquisition. This officer represents the battery at division artillery or group artillery level and must be able to instantaneously give advice or suggestions concerning the employment of the battery. His specific duties are—

a. He is the commander's representative at higher artillery headquarters.

b. He supervises the training of his liaison section.

c. Upon assignment or each change in the mission of the supported unit, he should—

- (1) Obtain all available information concerning the situation of his own unit and of the unit with which he maintains liaison.

- (2) Know the status and location of friendly artillery.
- (3) Know his unit's plans for displacement to include requirements for road space, etc.
- (4) Secure necessary maps.
- (5) Arrange for receipt of SOIs and SSIs.
- (6) Inform the processing section of the current friendly and enemy situation by preparing an overlay which also depicts the FEBA, GOPL, COPL, NFL and other pertinent factors which have been established by SOP.

d. Upon arrival at the command post of the supported unit, the liaison officer reports to the supported unit commander or his designated representative, and briefs him on the capabilities of the battery. He also establishes communication with his parent unit.

e. During his tour of duty, the liaison officer—

- (1) Insures receipt of information obtained by his battery.
- (2) Keeps the supported commander informed of the target acquisition situation and the capabilities of the battery as the situation changes.
- (3) Keeps his commander informed of the location and plans of the supported unit and of any changes in those plans.
- (4) Transmits requests for registration of artillery upon receipt of the mission from the supported artillery headquarters.
- (5) Coordinates adjustment of fires by the target acquisition platoons.
- (6) Assists in receipt of meteorological information by the supported unit, should the target acquisition battalion have a met section in the vicinity.

- (7) Arranges for prompt exchange of intelligence information between his parent unit and the supported unit.
- (8) Makes visits to his own headquarters when conditions permit to transmit any other pertinent data appropriate for inclusion in the unit's report.
- (9) Assists in exchanging survey information.

f. Duties specifically pertinent to the liaison officer are to—

- (1) Act as a target acquisition advisor in the absence of his commander, prepare required input for the supported unit's target acquisition plan, and act as an advisor on the survey capabilities of the battery.
- (2) Accompany the supported unit commander on reconnaissance when required.
- (3) Remain with the supported unit until a change of mission dictates his departure.

- (4) Keep his commander informed of all patrols and air movements to include the number of personnel, time of starting, mission, return route, and expected time of return.
- (5) Coordinate other activities as required.

g. The target acquisition battery liaison officer is responsible for transmission of data to the battery processing section so that the target acquisition effort can be so directed as to assist the maneuver elements in the accomplishment of their mission.

h. The liaison officer keeps his commander informed of the situation and of the supported unit's fire plan and observation plan. In reporting the situation, he must include all available information since he may be his commander's only or primary source of this type of information. He keeps the supported unit commander informed of the situation of the target acquisition battery including changes in capabilities, small arms ammunition status, casualty status, present or possible commitments which might affect the present mission.

Section VII. PROCESSING SECTION

5-32. General

Although the field artillery target acquisition battalion is normally assigned the tactical mission of general support of corps artillery, one or more of the target acquisition batteries may be assigned the tactical mission of direct support of a division artillery or a field artillery group. In this case, the platoons report their data directly to the battery processing section for evaluation and dissemination. The processing section should be collocated with the fire direction center of the supported unit to facilitate rapid and timely reporting of all targets and general intelligence information. This information is also transmitted to the FATAB operations section for informational purposes.

5-33. Organization

The processing section, which is organic to each target acquisition battery, operates under the general supervision of the battery executive officer. In this capacity, the battery execu-

tive officer acts as the battery S2/S3. The processing section is completely mobile and can operate 24 hours a day.

5-34. Duties of the Executive Officer

As supervisor of the battery processing section activities, the battery executive officer is responsible for—

a. Close coordination with the S2 of the supported unit in securing needed information concerning suspected target areas, condition of routes of approach, and future position areas. Future position areas must also be coordinated with the S3 of the supported organization to insure that no position areas are selected that fall within the position area of another unit.

b. Preparing the battery target acquisition plan. This plan normally will be disseminated orally and will consist of the location of the general areas in which the different devices will be employed, the location of the suspected

target areas, plus any special instructions and guidance that may be required for a given situation.

c. Informing the battery survey officer of intelligence matters affecting survey operations. This information would consist of the map location of the radars, flash observation posts, and microphones of irregular sound bases. If a regular sound base is used, the exact coordinates of one microphone position and the azimuth of the base, are given to the survey officer. The battery executive officer also provides the survey officer with information affecting the safety of the survey personnel such as which areas have been swept for mines, etc.

d. Initiating a systematic and coordinated search by the battery collecting agencies for target information. To accomplish this, he must—

- (1) Maintain close liaison with the intelligence sections of higher, adjacent, and supported units for exchange of information and for mutual assistance in the collection of target information.
- (2) Foresee the need for, obtain, and distribute maps, SOI, and SSI.

5-35. General Section Duties

General section duties performed by the personnel of the processing section are—

a. *Gathering Plans.* Gathering the perimeter defense plans from all battery agencies.

b. *Keeping the Daily Staff Journal.*

- (1) The staff journal is a chronological record of events affecting a unit or a staff section during a given period of time, usually 24 hours. The basic purposes of the staff journal are to—
 - (a) Assist in a more efficient conduct of operations.
 - (b) Provide a ready reference for the commander and his staff and higher headquarters.
 - (c) Serve as a permanent record for training purposes, operational reviews, and historical research.

- (2) The contents of the staff journal pertain to matters such as liaison, weather, meetings, command conferences, command decisions, etc.; synopsis of written, oral, radio, and telephone messages. The journal will be closed out with a brief summary of events and plans for the following period.

c. Maintaining a capability overlay of all agencies within the battery. This will include visibility diagrams. A copy of the consolidated capability overlay will be forwarded to the S2 of the supported unit and battalion operations.

d. Collecting and evaluating information and rapidly disseminating pertinent target and general information. (Evaluation is defined as the appraisal of an item of information to determine its pertinence, reliability, and accuracy.) Target locations are recorded on DA Form 6-6.

- (1) *Pertinence.* Immediately after its receipt by the processing section, information is quickly examined to determine its relevancy and value. Is it information of the enemy or of the characteristics of the area of operations? Is it of value to the unit or to higher, lower, or adjacent units? Is it needed immediately and, if so, by whom? Is it of future value? These questions should be answered in estimating the pertinence of the information.
- (2) *Reliability.* The reliability of the source and the collecting agency must be examined before information can be evaluated. To what extent is the source or agency accurate and reliable? Has the agency sufficient training, experience, and ability to accurately report the information in question? Could the information actually have been obtained under conditions existing at the time (time and space, means employed, visibility, etc)? These questions should be answered in estimating reliability of the source and the collecting agency.

- (3) *Accuracy.* The accuracy of the information must be examined separately from the reliability of the source or collecting agency. Is the purported fact or event at all possible? Does it agree or disagree with known facts? Can the information be confirmed or corroborated by a different source or agency? If the information differs from other information and the conflicting terms cannot be reconciled, which information is more likely to be correct? These questions should be answered in estimating the accuracy of each item of information.

5-36. Processing

a. When in the direct support role or in an attached status, if the processing section is collocated with the supported unit S2/S3 complex, then it acts as a relay station only. The counterbattery intelligence officer (CBIO) at the supported unit will maintain all appropriate overlays, charts, and card files pertinent to counterbattery fires.

b. If the processing section is located a short distance away from the supported unit's counterbattery complex, it will maintain the following information:

- (1) A counterbattery intelligence map.
- (2) An overlay depicting enemy dispositions.
- (3) Shelling report (SHELREP) overlay.

- (4) An overlay depicting OP reports.

c. This will be done to keep the battery commander abreast of the situation and provide a tool for him on which to base advice or decisions. The maintenance of this information is not intended as a duplication or backup of the CBIOs area of responsibility, but only to have the information immediately available to the battery commander.

d. In the battalion role of general support to corps artillery, the battery is located near a division artillery or group artillery headquarters to facilitate future operations. The battalion operations center is near or collocated with the corps artillery FDC to permit rapid exchange of data. The data collected by the platoons will be forwarded through the processing section to battalion operations. In so doing, the processing section will record all information and perform the previously mentioned functions to keep the battery commander informed. This same information is available to the higher artillery headquarters located nearby.

e. Local SOPs may alter the general duties and responsibilities of the processing section. Until they do so, the primary mission of the section is to pass on as quickly as possible pertinent information reported from the platoons. By maintaining the various overlays and charts, the battery commander is kept informed at all times to assist him in making decisions.

CHAPTER 6

SPECIAL OPERATIONS

6-1. Cold Weather Operations

a. General. The measures to overcome handicaps of snow and extreme cold are technical rather than tactical. Heavy snow greatly decreases mobility. It is sometimes necessary to replace trucks with track-laying vehicles. The use of trail-breaking vehicles to pack roads and trails in advance of wheeled or track-laying vehicles is recommended. Hand-drawn sleds or toboggans should be available. Extreme cold weather necessitates special measures in the use of certain instruments and equipment. The lubricants used in theodolites, observing instruments, and in the sound recording set often freeze. The use of prescribed arctic-type lubricants usually corrects this trouble, although under the worst conditions, heating may be necessary. Metal equipment must be insulated against direct contact with the bare skin. In the arctic, the magnetic needle should not be used for orienting the transit. Special measures to insure proper operation of vehicles, weapons, and instruments are included in appropriate technical manuals.

b. Sound Ranging Equipment. For operations in temperatures below 10°F., the lubricant in the reduction gearcase of the paper-drive motor of the recorder unit on the Sound Locating Set GR-8 should be replaced by a mixture of equal parts of medium weight cup grease and fuel oil. All other lubricants are those prescribed for use in the arctic. Microphones may be suspended in a hole dug in the snow or earth, or they may be used on the surface. They must be inspected frequently for frosted relay contacts. They will operate in a normal manner when the frost is removed.

c. Radar. The operation of radar sets for counterbattery and countermortar purposes may be hampered or the sets may be rendered

ineffective by various cold weather conditions. Heavily falling snow may reduce the range and sensitivity of radar equipment and may even make the detection of projectiles impossible. Snow on the ground may increase clutter. Excessive icing of the antenna may distort the radar beam or cause sluggish movement of the antenna.

d. Camouflage and Fortifications. Camouflage and field fortifications present special problems. Ordinary camouflage nets are sometimes worthless because the snow falls through them and the position shows as a definite dark patch. White cloth should be used to cover the nets or as drapes to cover vehicles. Digging emplacements or trenches in frozen ground usually is impossible without the use of explosives.

6-2. Mountain Operations

a. Mobility. The mobility of the target acquisition battalion is limited in mountainous terrain. Motor travel usually is limited to roads, and speeds are considerably reduced. Frequently, equipment must be transported considerable distances by backpack or on pack-animals, and installations must be prepared by manpower or with the aid of packanimals.

b. Observation. Observation posts should be echeloned in altitude, if possible, as well as in width and depth since observation is often obscured by sudden fog. Independent short bases may be in the only type flash base that can be installed because of the difficulty of establishing survey and communication and of getting multiple observation posts that provide observation in the same zone.

c. Communication. Wire is hard to install and maintain. Radio reception is usually satisfactory, but dead spaces should be expected

because of the shadow effect of hill masses. These dead spaces may be overcome by making full use of special antenna equipment, or in some cases, by the use of relay stations.

d. Radar Positions. In mountainous terrain, it may be impossible to find radar sites which have adequate electrical screening. This may hamper or even prevent successful radar operation.

e. Reconnaissance and Selection of Position. Extensive reconnaissance is necessary. The selection of positions may be limited by inaccessibility and may be further limited by special requirements for flash and sound bases. Maps of mountainous regions, if available, are seldom accurate. A correct appreciation of the terrain can be gained only by ground reconnaissance, supplemented by a study of aerial photographs or maps. The employment of local guides is often advantageous.

6-3. Desert Operations

a. The target acquisition battalion uses its normal installations in desert warfare. The lack of landmarks increases the difficulty of survey and target identification. Movement in desert country is largely dependent on some means of land navigation; careful adherence to a predetermined compass direction for a given distance is the most common method. Celestial navigation may sometimes be useful.

b. Ground observation frequently is limited by undulations of the terrain, shimmering atmosphere, dust, and sand storms. Portable observation towers may be very valuable where the terrain offers no natural vantage points. Sound, flash, and radar installations are employed to the maximum.

i. Natural concealment, except defilade, is difficult. Protection against hostile shelling and air attack may be obtained by dispersion and field fortifications. Camouflage is used extensively. Security against hostile ground attack, especially armored attack, must be stressed.

6-4. Jungle Operations

a. General. The jungle does not change the principles of operation of the target acquisition battalion, but it does affect its application, chiefly by restricting observation, movement, and supply.

b. Mobility. Motor movement in the jungle is retarded and slow, and usually it is confined to roads and trails. Equipment will often have to be backpacked; sound and flash bases will often have to be installed completely by hand without the use of vehicles. Special equipment and packboards should be provided. Organic means of transportation may be supplemented by boats and barges; by the use of sleds or carts drawn by animals; and by manpower, tractors, helicopters, and amphibious vehicles.

c. Observation. Flash observation in the jungle is extremely limited. Personnel must be trained to exploit available commanding ground. Careful scrutiny and the ability to identify all types of enemy installations, weapons, and transport are very important. Observation is usually difficult because of very large trees with dense interlacing foliage; the undergrowth is massive. A limited field of view can often be cut through the undergrowth with machetes or bush knives. Observation posts should always have overhead cover because overhanging foliage often causes tree bursts. Personal reconnaissance is a prime necessity in choosing the location of observation posts or other installations. All adjacent troops should be notified before trees are climbed to gain observation. Security for the observer is important because enemy patrols may infiltrate into the position, particularly when conducting stability operations. Observers may accompany reconnaissance patrols to locate targets. Infantry patrol leaders often return by way of artillery observation posts to point out targets they have located. It is often possible to use only sound bases and radars. The prevalence of high-angle fire in jungle operations greatly facilitates radar location of enemy weapons. Observation from boats offshore may be feasible in coastal regions. Climate, weather, insects, and animals also present problems to the observer.

d. Conduct of Fire.

- (1) Frequently, adjustment will be conducted by sound or radar. Difficulty of survey in jungle terrain may make deliberate occupation of position extremely slow, especially in the initial phase of the operation. In many cases,

irregular bases, located by "shooting in" or by inspection of air photos, will be used.

- (2) Flash high-burst adjustment may be used advantageously. As a rule, ground bursts will be obscured by jungle growth and trees.
- (3) Radar registration and adjustment will be frequent. The simplicity of the survey required for radar and the fact that line-of-sight observation to the burst is not required in radar adjustments are advantages in jungle operations. Adjustment on observed-firing-chart control or by burst location on target location may be used when no survey control is available.

e. Communication.

- (1) Wire may be the principal means of ground communication. The supply of wire and the means of laying it are usually limited; much wire has to be laid by hand. Initially, existing trails may have to be used for line routes, but later circuits should be rerouted through the jungle or buried along the original route. Wire parties may require protection by accompanying patrols.
- (2) The range of radio is greatly reduced. Waterproofing and fungi-proofing equipment are critically important in humid areas and during rainy seasons. Dismounted messengers are used extensively. Oral messages are preferable because the danger of written matter falling into enemy hands is relatively great.

f. Position Areas. Good position areas usually are few in number and are limited to locations near existing roads, trails, or clearings. In many cases it will be necessary to clear a position area and construct a road on helicopter pad prior to occupation.

g. Survey. Reliable maps may not be available. Aerial photographs are valuable, but important terrain features are often obscured by dense vegetation. Survey is of particular importance because of the reliance placed on unobserved fires, and it is slow because of the

amount of brush cutting necessary. Usually, the target area must be tied to the position area by firing. Due to the slowness of normal survey, survey by radar will frequently be used until normal survey is complete. Radar survey is not a substitute for normal survey. Location of frontlines by radar is especially useful in jungles. Use of radar in the jungle necessitates considerable clearing of the jungle growth to provide clear fields of operation. When clearing the line of site, consideration must also be given to the dangers of destruction of natural camouflage.

h. Local Security. Camouflage and concealment are relatively easy. Overhead cover for personnel is necessary because bombs and other projectiles are likely to burst in the tree tops. Ground attack by infiltration is always a threat; each battery and smaller size element must establish a strong perimeter defense.

6-5. Amphibious Operations

The target acquisition battalion is seldom in the assault wave of an amphibious operation; however, its forward echelons, battery and battalion, must be landed early in the operation. Preparation for landing operations is extremely important. Prior knowledge of terrain from intensive map study and knowledge of enemy dispositions is essential. Information on the progress and whereabouts of our own troops is also of extreme importance. Special precautions must be taken to waterproof vehicles and to protect materiel—weapons; communication equipment; and sound, flash, and radar ranging equipment—from exposure to salt water spray, immersion, or dampness. All equipment must be carefully cleaned immediately after exposure. In loading, precautions must be taken to facilitate entry into action; equipment needed first should be readily available. Reconnaissance parties should be first ashore to reconnoiter routes and select positions for installations. Survey personnel and equipment must also be landed early. To facilitate survey, existing maps should be studied thoroughly so that prominent terrain features can be identified for orientation and for use in installations as soon as the units are landed. A minimum of 3 days' rations should be carried with the landing parties.

6-6. Stability Operations in an Internal Defense and Internal Development Environment

a. General. Stability operations may take place in any area. The conditions covered in paragraphs 6-1 through 6-5 will apply equally here as in conventional or nuclear warfare. However, additional factors must be considered in the employment of FATAB units during these operations.

b. Security. Stability operations are characterized by lack of front lines and numerous independent actions. This necessitates extra security measures for the relatively independent operations of the FATAB elements. Survey parties should have security elements from the supported force to provide defense while they conduct their survey. Flash and sound observation posts, radar, and meteorological sections should be established within friendly perimeters or have additional security personnel assigned to them.

c. Employment. Due to the relatively small independent actions, sound and flash bases will normally be shorter than in a conventional linear battlefield configuration. Zones of action of supported units will be scattered and individual offensive actions will involve small land areas. A static defensive posture will require coverage in all directions. Flash bases should, as the tactical situation permits, occupy the geographic crest of hills instead of military crest. Radars will be employed to protect base camps and may be positioned outside the defended area to cover an area of known

or suspected enemy activity. Primary and alternate sectors of fire are selected depending on the mission, terrain, and tactical situation. Because friendly units will be scattered and enemy activity may come from any direction, it is essential that the target acquisition elements maintain current and accurate situation maps, both friendly and enemy.

d. Movements. Emphasis must be placed on counterambush methods during ground movements. Small convoys or individual vehicles are particularly susceptible to ambush. Mines are used frequently and measures must be taken to protect personnel. The most effective protective measure is to line the bottom of vehicles with sandbags. Movement of elements of the battery by helicopter provides many advantages over ground movement.

e. Communications. Reliance must be placed almost entirely upon radio except within friendly perimeters. Wire communication from unit to unit is not reliable.

f. Civic Action. This type of operation is largely psychological and its success depends upon the acceptance of military units by the local population. As far as is practical, units and individual elements should be prepared to aid the local population, especially within their specific technical capabilities. Survey can assist in laying out roads and establishing property boundaries. Medics should be ready to furnish some medical assistance. Assistance need not be limited to specialty areas. These actions will be governed by guidance and directives from higher headquarters.

APPENDIX A

REFERENCES

A-1. Army Regulations

AR 117-5	Military Mapping and Geodesy.
AR 320-5	Dictionary of United States Army Terms.
AR 320-50	Authorized Abbreviations and Brevity Codes.
AR 611-201	Enlisted Military Occupational Specialities.

A-2. Field Manuals

FM 3-10	Employment of Chemical and Biological Agents.
FM 3-12	Operational Aspects of Radiological Defense.
FM 5-15	Field Fortifications.
FM 5-20	Camouflage, Basic Principles and Field Camouflage.
FM 5-146	Engineer Topographic Units.
FM 6-2	Artillery Survey.
FM 6-10	Field Artillery Communications.
FM 6-15	Artillery Meteorology.
FM 6-20-1	Field Artillery Tactics.
FM 6-20-2	Field Artillery Techniques.
FM 6-40	Field Artillery Cannon Gunnery.
FM 6-121	Field Artillery Target Acquisition.
FM 6-122	Artillery Sound Ranging and Flash Ranging.
FM 6-125	Qualification Tests for Specialists, Field Artillery.
FM 6-140	Field Artillery Cannon Battalions and Batteries.
FM 6-160	Radar Set, AN/MPQ-10.
FM 21-40	Chemical, Biological, and Nuclear Defense.
FM 23-65	Browning Machine Gun Caliber .50 HB, M2.
FM 31-12	Army Forces in Amphibious Operations.
FM 31-16	Counter guerrilla Operations.
FM 31-22	U.S. Army Counterinsurgency Forces.
FM 31-25	Desert Operations.
FM 31-30	Jungle Training and Operations.
FM 31-70	Basic Cold Weather Manual.
FM 31-71	Northern Operations.
FM 31-72	Mountain Operations.
(C) FM 32-5	Signal Security (SIGSEC) (U).
FM 57-35	Airmobile Operations.
FM 101-5	Staff Officer's Field Manual: Staff Organization and Procedure.

A-3. Standardization Agreements (STANAGS)

STANAG 2047	Emergency Warnings of Hazard or Attack.
STANAG 2103	Report of Enemy Chemical, Biological, and Nuclear Attack.

A-4. Technical Manuals

TM 5-231	Mapping Functions of the Corps of Engineers.
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INDEX

	Paragraph	Page		Paragraph	Page
Air weather service -----	5-25	30	Duties of personnel -----	1-15	5
Amphibious operations -----	6-5	37	Operations platoon -----	1-15	5
Ballistic meteorological messages -----	5-21	29	Survey platoon -----	1-15	5
Bases:			Jungle operations -----	6-4	36
Deliberate -----	5-5	23	Meteorological operations to include		
Rapid -----	5-4	23	wind data for fallout prediction -----	5-16	28
Battalion commander -----	1-14	3	Missions:		
Battery position:	3-7	16	Flash ranging platoon -----	5-3	22
Security -----			Meteorological sections -----	5-16	28
Selection -----	3-5	16	Radar platoon -----	5-7	23
Capabilities and limitations:			Sound ranging platoon -----	5-1	21
Battalion -----	2-2	12	Survey information center -----	5-12	25
Flash ranging -----	2-2	12	Survey platoon -----	5-11	24
Meteorology -----	5-20	29	Target acquisition battalion -----	1-13	3
Radar -----	2-2	12	Mountain operations -----	6-2	35
Sound ranging -----	2-2	12	Occupation and organization of posi-		
Survey -----	2-2	12	tion -----	3-6	16
Centralized control -----	2-5	14	Operations:		
Cold weather operations -----	6-1	35	Amphibious -----	6-5	37
Command post:			Cold weather -----	6-1	35
Battalion -----	3-8	17	Desert -----	6-3	36
Battery -----	3-9	18	Jungle -----	6-4	36
Selection -----	3-5	16	Mountain -----	6-2	35
Communication -----	4-1	20	Stability -----	6-6	38
Computer meteorological messages -----	5-22	29	Organization of command post:		
Decentralized control -----	2-5	14	Battalion -----	3-8	17
Deployment -----	2-5, 2-6	14	Target acquisition battery -----	3-9	18
Desert operations -----	6-3	36	Party, battery commander -----	3-4	15
Displacement -----	3-6	16	Position areas -----	3-5	16
Duties of personnel:			Principles of employment -----	2-1	12
Battalion headquarters -----	1-14	3	Radar operations -----	5-7	23
Headquarters battery -----	1-15	5	Reconnaissance -----	3-3	15
Target acquisition battery -----	1-16	8	Security -----	3-7	16
Employment -----	2-3, 2-4	13	Sound ranging operations -----	5-1	21
Flash ranging operations -----	5-3	22	Stability operations -----	6-6	38
Headquarters battery:			Tactical employment of battalion -----	2-4	13
Communication platoon -----	1-15	5	Target acquisition battery -----	1-16	8

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